meta... the news digest magazine

Volume XXV - No. 12 December, 1952

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Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXV, No. 12 December, 1952

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CONTENTS

IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

A.S.M. Annual Meeting

Reports of the President, Secretary and Treasurer; Election of Officers

THE ANNUAL MEETING of the American Society for Metals was held in Philadelphia on Wednesday morning, Oct. 22, 1952, during the National Metal Congress and Expo-

President Chipman presented the slate of new officers nominated last May (see *Metals Review*, June 1952). No additional nominations having been received, the secretary cast the unanimous vote of the members for these candidates.

Annual reports of the president, treasurer and secretary were presented, and are reproduced in summary below. They will be published in full in the next volume of the A.S.M. *Transactions*.

PRESIDENT'S REPORT

Presented by John Chipman

Head of the Department of Metallurgy
Massachusetts Institute of Technology
Retiring A. S. M. President

The past year has been one of solid accomplishment on the part of our Society. Your officers and trustees have endeavored throughout the year to emphasize and to build up the Society's educational programs . . . with the result that our contribution to the strength of the nation is becoming daily more important.

Your Educational Committee has been active and successful in planning educational programs for the national convention, in developing teaching aids such as motion pictures on metallurgical subjects, and in fostering educational activities of the chapters. Practically every chapter is engaged in some sort of educational program. . . The communities in which chapters are located have come to regard the ASM chapter as the fountainhead of all knowledge on metallic subjects.

Your Advisory Committee on Metallurgical Education has initiated several new programs during the year. One has been the establishment of teaching awards for proficiency and excellence in the teaching of metallurgy in the colleges. Three awards of $2000 are to be made this morning to young teachers of metallurgy. . .

Another recent innovation at the collegiate level is the appropriation of funds for visiting professorships in metallurgy . . .

For some years your Society has been concerned by the insufficient numbers of students of metallurgy enrolled in the colleges. We have prepared bulletins and pamphlets and have distributed these in considerable numbers in the high schools of the country with the purpose of attracting more students into metal engineering fields.

In his visits to some 25 chapters, your President has drawn attention to the nation's need for more engineering students. Many chapters have taken an active interest in recruiting science students for the colleges and have sent representatives to the local high schools with this purpose in view. I believe that these efforts are beginning to bear fruit.

Another new activity of your Society is being carried out with the cooperation of the National Science Teachers Association. This is a contest in the high schools and junior high schools of the United States and Canada in which the student prepares a "project" related to science or engineering. A number of prizes and awards were given to students and to the schools they represent. The total amount of the awards, which together with administrative costs amounted to $10,000, was supplied by your Society . . . the only technical society that has given financial backing to the "Future Scientists of America Foundation" in their direct approach to junior and senior high school students.

The growing scarcity of engineers is reflected in an increased demand for graduates of technical and vocational institutes . . . at the high school level. . . . Your trustees are convinced that there is an important job the Society can do in this field, and a new committee has been formed, with Horace Kneer as chairman, to view the problem on a nation-wide scale and recommend whatever action seems appropriate. . . .

Thus you can see that your Society is active along the educational front, from the practical man of industry or the boy in junior high school through high school or technical institute and into the colleges.

Another recent activity of your Society is the establishment of a new international journal of the science of metals. The need for such a journal has developed rapidly in recent years with the increased application of physics and chemistry in the study of metals. A year ago, during the World Metallurgical Congress, a few people from each participating country were brought together to discuss the preliminary plans. As a result, a proposal was sent to metallurgical, chemical and physical societies throughout the free world. At the present moment there are 14 such societies in 11 countries cooperating with ASM, and the first issue of the new "Acta Metallurgica" under editorship of Bruce Chalmers is due to appear in January 1953 . . . For those members of ASM who want the new journal, it will be available at half price.

The officers and trustees, as usual, have been busy. There were five meetings of the Board of Trustees—on Oct. 31, 1951, and on Jan. 30, June 2, July 31 and Oct. 21, 1952. Your President visited 25 chapters, and members of the board visited 14.

A new series of regional group meetings has been undertaken for the purpose of bringing the national organization into closer contact with individual chapters. In these meetings the chairman and vice-chairman-elect from some 5 to 8 chapters in a district have sat down with the Secretary and usually with some member of the Board of Trustees in an all-day session on chapter problems. During the year the following groups participated:

Pacific Northwest — Seattle, Portland, Vancouver, Spokane, Richland

New England — Boston, Worcester, Springfield, Hartford, Providence, New Haven

Atlantic Central—New York, Philadelphia, Washington, Baltimore, Lehigh Valley, York

Ohio-Michigan — Toledo, Detroit, Saginaw Valley, West Michigan

Northeastern-Ohio—Western Pennsylvania — Northwest Pennsylvania, Pittsburgh, Youngstown, Warren, Canton-Massillon, Akron, Cleveland

In the month of May this year the entire membership of the Society was saddened by news of the deaths of two of our beloved past-presidents; Dr. Marcus Grossmann passed away in Pittsburgh and Dr. George B. Waterhouse in Boston. It is with the deepest regret that we record this great loss to the metallurgical profession.

For the first time the Society held a midwinter meeting. This was strictly a technical meeting for the

purposes of presentation and discussion of technical papers. It was held in Pittsburgh on Jan. 31 and Feb. 1. The sessions were well attended and contained some valuable technical papers which have subsequently appeared in *Transactions*. The next such meeting will be in Los Angeles the week of Mar. 23, 1953, as a part of the Western Metal Congress.

Your Society has been sweeping off the cobwebs of isolationism and has worked for the establishment of more cordial relations among the metallurgical societies of the world. Full justification of this policy is seen in the tremendous success of the World Metallurgical Congress which was held last year. You will be interested in the very attractive volume of some 835 pages published by the Society giving the full story of that meeting and the papers presented . . .

I have just returned from a visit to Europe in which I had the pleasure of representing ASM at a meeting of the Italian Metallurgical Association. In Italy, and in other countries that I visited, I found people enthusiastic about the World Metallurgical Congress and keenly appreciative of the part which ASM played in sponsoring and organizing it. From my conversations with many of the leading metallurgists in Europe, I can say that the prospects are bright for a second World Metallurgical Congress in Europe, perhaps in 1955 or 1956.

And now I come to what I hope will prove to be the outstanding event of the year, the proposed establishment of the American Society for Metals Foundation for Education and Research. Your trustees have given much careful thought to the problem of how we might best insure the continued growth of our educational activities. The healthy state of our treasury during recent years has given us confidence that we have achieved that goal of early planning, a figure for total assets which is twice the annual budget. The excess above this goal we now propose to set aside in a special fund whose income can be used for education and research.

There is an additional motive, and a very practical one, for establishment of the Foundation. Recent revisions of the revenue laws have changed the status of the income of tax-exempt institutions. At the present time the net income of all tax-exempt organizations is subject to review each year by federal tax authorities. The establishment of the Foundation will provide a place where any excess income can be invested to provide future income for educational purposes . . .

The proposal for establishment of the American Society for Metals Foundation for Education and Research will be presented to you this morning. I urge you to join with the trustees in unanimously approving the proposal.

It is customary in the President's report to record the high spots of the previous meeting. You are all fully aware that the most distinctive feature of the 33rd annual convention was the First World Metallurgical Congress which accompanied it. It is an understatement to point out that this congress was sponsored solely by ASM. It was conceived in the fertile mind of your Secretary and it was brought to successful fruition by his inspired and untiring efforts.

It is appropriate to record that at the concluding banquet of the Congress three silver medals bearing the insignia of the World Metallurgical Congress were presented by ASM trustees: the first to Charles E. Wilson, director of Defense Mobilization, who delivered the principal address; the second to Zay Jeffries, director-general of the Congress; the third to Walter Jominy, president of ASM, sponsor of the Congress. It is also appropriate to mention that the trustees presented one solid gold medal of the same design—this one to William H. Eisenman.

Other events of the 33rd annual convention included the following: the President's Medal was awarded to Arthur Focke, past-president; the Henry Marion Howe Medal was issued to B. J. Lazan of the University of Minnesota; the Sauveur Achievement Award was presented to Robert F. Mehl, director of the Metals Research Laboratory, Carnegie Institute of Technology; the ASM Medal for the Advancement of Research was presented to Gwilym Price, president of Westinghouse Electric Corp., and the ASM Gold Medal was presented to Paul Merica, president of the International Nickel Co. The Campbell Memorial Lecture was given by C. H. Lorig of Battelle Memorial Institute.

In conclusion I wish to thank the societies that are cooperating with the American Society for Metals to make the present meeting another outstanding success. These societies are: American Welding Society; American Institute of Mining & Metallurgical Engineers, Institute of Metals Division; Society for Non-Destructive Testing. It is through this kind of cooperation that the National Metal Congress has grown into an event of major importance to the nation . . .

TREASURER'S REPORT

Presented by Ralph L. Dowdell

Head, Department of Metallurgy
University of Minnesota

This report on your Society covers the fiscal year ending Aug. 31, 1952. .

The carrying value of all securities, including accrued interest, was $1,976,351.24 on July 14, 1952. On closing the year Aug. 31, 1952, the carrying value of all securities including accrued interest was $1,424,210.96.

The approximate market value of securities, including accrued interest on bonds, was $1,636,763.65 on Aug. 31, 1952, which represents an appreciation in value of about $212,552.69

During the year the Board of Trustees authorized a grant to the American Society for Metals Foundation for Education and Research in the amount of $575,000 out of prior years' earnings and $75,000 out of the current year's earnings.

The cash account was decreased $98,187.56 from last year, so that more funds could be invested.

There has been no fundamental change in investment policy for the portfolio over the past year.

Dividends and interest earned amounted to $78,768.31 or about 3.98%, based on the carrying value, as compared to about 4.16% for the preceding year. With a lower proportion of stocks, the yield has been slightly lowered.

Corporate stocks constitute about 30% of the total investments, while last year they constituted about 38% of the total holdings.

Total income and expense for the year ending Aug. 31, 1952, are as follows:

Income	$1,424,814.98
Expense	1,266,643.90
Net Income	**$ 158,171.08**
Appropriated for Educational Purposes	140,524.47
Unappropriated Net Income	**$ 17,646.61**

The approximate income and its disposition for the fiscal year ending Aug. 31, 1952, are shown in the following tabulation:

	Income	Income Used
Metal Progress	40%	33%
Metal Exposition	26	19
Membership—Gross dues	16	..
Returned to Chapters	..	7
Expense	..	3
Book Publishing	6	6
Interest and Dividends	5	..
METALS HANDBOOK	4	2
Metals Review	1	3
TRANSACTIONS	1	3
General Administration	..	12
Educational Projects	..	10
Miscellaneous	1	1
Added to Surplus	..	1
	100%	100%

The gross income from dues was $239,686.71 of which $99,029.82 was returned to local chapters. The combined assets of the 82 local chapters have risen to about $248,000 which is an increase of about $29,000 over the previous year.

The income from interest earned on investments was $78,768.31.

Both *Transactions* and *Metals Review* were distributed to the membership at a net cost to the Society of about $44,541.97 and $21,403.76 respectively.

The large item called "Educational Projects" contains the following, mostly for educational purposes:

ASM Foundation for Education and Research	$64,024.47	(carrying value)
Teaching Awards and Expenses	6,500.00	
Chapter Educational Activities	5,000.00	
Second World Metallurgical Congress	15,000.00	
Program with National Science Teachers' Association	15,000.00	
ASM Visiting Lectureship	10,000.00	
Building Fund	25,000.00	
	$140,524.47	

The net assets of the American Society for Metals are approximately $2,104,636.15 . . .

Junior Membership—Junior members and other students whose course requirements provided for work in metallurgy have been given an eight-page booklet which contains data sheets reproduced from *Metal Progress* and other items of information of interest to the young engineer.

These were distributed through the heads of the metallurgical departments and through the deans of engineering.

Junior Employment—In the February issue of *Metals Review,* all ASM junior members completing their metallurgical work in June were introduced to the members of the Society and to many others by having published their pictures, biography and other items of information relative to their availability for future employment.

An additional service was organized this year for summer employment . . .

There was no charge to either the student or the employer for this ASM summer service which offered 1858 job opportunities.

Losana Gold Medal—It is a pleasure to report that the president of the Society, Dr. John Chipman, was the recipient of the Losana Gold Medal presented by the Italian Metallurgical Society on Sept. 20 . . . The medal was given in recognition not only of Dr. Chipman's achievements in the field of metallurgy but also in appreciation of the cordial reception the Italian conferees received when they attended the first World Metallurgical Congress.

National Metal Congress . . . It is again the united effort of four national technical societies . . . the American Society for Metals; American Institute of Mining & Metallurgical Engineers, Institute of Metals Division; American Welding Society; and Society for Non-Destructive Testing.

Young Engineers' Day—As related in the President's report, the Society and all the chapters have been energetically active in endeavoring to increase enrollment in engineering schools . . . Consequently, it was determined that a great advantage would be gained if the engineering students within 150 miles of the convention city could be brought in contact with the exhibitors and the exhibits in the National Metal Exposition. Invitations were extended . . . to 26 schools for the students in all branches of engineering to be the guests of the Society on Friday, Oct. 24.

The invitation received a most cordial reception, and approximately 2500 engineering students—1700 from outside Philadelphia—will visit and study the exposition on Oct. 24.

The Society will absorb the expense of bus transportation, and . . . a buffet luncheon.

National Metal Exposition — The Exposition continues to grow, not only in size but quality . . . The Metal Show is recognized as an institution not only by manufacturers who display their products but by executives and the engineering staffs that use their products.

This year there are two new features to the Metal Show . . .

The first is an endeavor to dress up the Show . . . Cloth, the old standby for some 33 years, is giving way this year to the beginning of a new decor scheme in which metals and pictorial presentation of metal progress constitute the decorative medium . . .

The second innovation is the red carpet. It's being used on the basis that nothing is too good for the comfort of the customer . . . and also to ease your way along the two miles of aisles in the Show . . .

And so pass the years of the A.S.M. in an ever-changing degree of accomplishment but always in a forward direction . . . I trust you have been aware that this record is your record. You and you alone by your faithful and conscientious devotion to your Society have made it possible. Your continued support and cooperation will guarantee even greater accomplishments in the years to come.

SECRETARY'S REPORT

Presented by W. H. Eisenman

Secretary, American Society for Metals

The American Society for Metals on Oct. 1, 1952, had a total membership of 21,599—a gain of 6.6% since last October. Of this number 18,421 or 85.3% were regular members, 1982 or 9.2% were sustaining members, 1092 or 5% were junior members. There were 54 honorary and life members, 50 on the armed services list.

Publications Committee—Seventeen persons constitute the membership of the Publications Committee for 1952, under the chairmanship of W. M. Baldwin, Jr. . . . .

During the year the Committee reviewed 66 papers. Of this number 41 were approved and prepared in preprint form; 30 of these are scheduled for presentation at this Convention and publication in *Transactions,* and the remaining 11 are scheduled on the program for the Western Metal Congress to be held in Los Angeles the week of Mar. 23, 1953, and also scheduled for publication in *Transactions.*

The Publications Committee held a meeting on May 27 and 28. . .

Educational Committee—The Educational Committee (N. J. Grant, Chairman) . . . held one formal meeting on Nov. 29, 1951, at which time the educational lectures for this convention were arranged as well as those for the 1953 convention. The 1952 lectures are:

1. Behavior of Metals at Low Temperatures—3-lecture series by R. M. Brick, J. R. Low, Jr., and C. H. Lorig.

2. Gases in Metals—4-lecture series by D. P. Smith, L. W. Eastwood, D. J. Carney, and C. E. Sims.

3. Metallurgical Tools for Alloy Conservation and Increased Production—4-lecture series by J. A. Berger.

The subjects for 1953 are (*a*) Fatigue, (*b*) Surface Protection Against Wear, and (*c*) Surface Protection Against Corrosion.

The motion picture film entitled "Heat Treatment of Steel" is still in the process of preparation. . .

Advisory Committee on Metalurgical Education—The President covered the activities of this committee (Alfred Bornemann, chairman) . . . in his report.

ASM Technical Committees Advisory to the Navy—The program has continued through which the Society assists the U. S. Navy in technical problems relating to conservation of scarce metals. In cooperation with the Minerals and Metals Advisory Board in Washington, ASM has now established a total of five technical advisory committees, each dealing with metal conservation in a different unit of naval equipment. In each instance, the ASM committee has been able to recommend ways and means for conserving scarce metals, either through substitution of one alloy for another or by a change in processing procedure or design. . . .

The Society is proud of the example which these members are setting. . .

Metals Handbook Committee—Demand for the current edition of the *Metals Handbook* has continued at a high level, and an additional 100,000 copies were printed in June of 1952. The Committee held no meetings during the year.

Special Libraries Association—For the third consecutive year the Metals Section of the Special Libraries Association is holding its fall regional meeting in conjunction with the National Metal Congress. The purpose of the meeting is to discuss matters of literature handling and documentation that are of mutual interest to both librarians and metallurgists.

The Section is also sponsoring a booth at the National Metal Exposition, designed as a miniature working library and reference service. . . .

Transactions—Since the last National Metal Congress, Vol. 44 and Vol. 44A of *Transactions* were published and distributed to the membership in April 1952. Vol. 44 totals 1232 pages and constitutes 61 articles with their discussions. It contains all of the papers presented at the October 1951 Convention held in Detroit, together with the papers presented at the Midwinter Meeting held in Pittsburgh on Jan. 31 and Feb. 1, 1952, and also interim papers received during the year that were not presented at a convention. . . .

Vol. 44A contains the 12 papers (335 pages) presented at the seminar on "Metal Interfaces" held on Oct.

13 and 14, 1951 . . . the subject being selected by a committee appointed by the Board of Trustees (J. H. Hollomon, Chairman) . . .

Preprints—Forty-one papers were prepared in preprint form and distributed to those members of the Society who requested them. This includes 30 papers presented at this Metal Congress, and 11 papers which will be among those presented at the Western Metal Congress.

The total number of pages for the 1952 preprints is 738. A total of 45,000 preprint copies were distributed free to the membership.

Metal Progress—The number of editorial pages, 680, is fairly constant over the years. Revenue advertising has shown a gratifying improvement, due to intensive work by the expanded number of representatives in the field . . .

While a considerable amount of editorial space has been given to the production, properties and uses of the "new" metals like titanium, zirconium, and thorium, this is warranted by today's trends in metal progress . . .

Two issues were almost pre-empted by the World Metallurgical Congress and contained the papers contributed by overseas conferees . . . Considerable attention has been given during the year to the metallurgical problems of the foundry.

Early in 1952 some additions were made to the editorial staff. Marjorie R. Hyslop (editor of *Metals Review* since 1934) was made managing editor of *Metal Progress* . . . Floyd E. Craig was employed as director of art and typography. E. C. Wright, long with National Tube Co. and now head of the department of metallurgical engineering at the University of Alabama, accepted appointment as consulting editor in the field of steel refining and manufacture.

Metals Review — During the 12 months from October 1951 through September 1952 *Metals Review* published a total of 700 pages—an increase of 68 pages over the preceding 12 months . . . Space devoted to news of chapter activities, doings of members, and headquarters actions remains about the same as in the past . . .

The Society again published in the February issue the biographies and photographs of the junior members to assist them in obtaining employment during the coming year.

The Metal Show section was published in September.

In February 1952 the staff was expanded by the appointment of Betty Bryan as associate editor . . .

The 8th volume of the ASM Review of Metal Literature was published this year . . .

Books—During the past year, a total of 25,827 books published by the Society was sold to members and others. This figure includes 1837 copies of the 1948 Metals Handbook.

During this period 7 titles were added to the publication list. These are: Transactions of the A.S.M., Vol. 44; How to Organize for Success, by W. H. Eisenman; Metal Interfaces—Seminar by 12 authors; Residual Stress Measurement, by 4 authors; Elements of Hardenability, by M. A. Grossmann; Review of Metal Literature, Vol. 8; Proceedings of the 1951 World Metallurgical Congress.

Following titles are now in preparation: Cast Bronze, by Harold J. Roast; Revision of "Principles of Heat Treatment" by M. A. Grossmann; Revision of "Engineering Alloys", by N. E. Woldman; Behavior of Metals at Low Temperatures; Gases in Metals; Metallurgical Tools for Alloy Conservation and Increased Production.

Books published by the Society were made available to junior members at reduced cost.

Seminar on Modern Research Techniques in Physical Metallurgy . . . It was divided into five sessions with the meeting room filled to capacity. This interest is a great compliment to the Committee . . . R. M. Brick, Philadelphia, Chairman.

Appointments to A.S.M. Standing Committees

At the meeting of the Board of Trustees of the American Society for Metals held Nov. 6, new appointments to the various national committees of the Society were announced by President Wilson and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration of the appointment.

Constitution and By-Laws Committee

H. E. Flanders, University of Utah, Salt Lake City, '53, Chairman.
Tom LaCrone, Lindberg Engineering Co., Kalamazoo, '55.
J. C. Neemes, Jr., International Nickel Co., Detroit, '54.
Dean W. Thompson, General Electric Co., Fort Wayne, '55.
L. G. Toye, General Electric Co., Erie, Pa., '53.
G. A. Roberts, Representative of the A.S.M. Board of Trustees.

Finance Committee

R. L. Dowdell, University of Minnesota, Minneapolis, Minn., Chairman, (A.S.M. Treasurer).
A. A. Hess, A.S.M., Assistant Treasurer, '53.
Benjamin B. Bullwinkle, Turck MacKenzie Co., Portland, Ore., '54.
Zay Jeffries, Pittsfield, Mass., '54.
K. R. Van Horn, Aluminum Co. of America, New Kensington, Pa., '55.
Clyde Williams, Battelle Memorial Institute, Columbus, Ohio, '55.
H. F. Wood, Wyman Gordon Co., Harvey, Ill., '53.
F. P. Zimmerli, Barnes-Gibson-Raymond, Detroit, '53.

Publications Committee

W. E. Mahin, Armour Research Foundation, Chicago, Chairman, '53.
William W. Austin, Jr., Southern Research Institute, Birmingham, Ala., '54.
B. L. Averbach, Massachusetts Institute of Technology, Cambridge, '55.
W. E. Bancroft, Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn., '53.
J. A. Berger, University of Pittsburgh, '55.
W. O. Binder, Niagara Falls, N. Y., '55.
C. L. Clark, Timken Roller Bearing Co., Canton, Ohio, '53.
A. H. Geisler, General Electric Co., Schenectady, N. Y., '54.
J. L. Gregg, Cornell University, Ithaca, N. Y., '55.
Malcolm F. Hawkes, Carnegie Institute of Technology, Pittsburgh, '54.
E. M. Mahla, E. I. du Pont de Nemours Co., Wilmington, Del., '53.
F. T. McGuire, Deere & Co., Moline, Ill., '53.
Peter Payson, Crucible Steel Co. of America, Harrison, N. J., '54.
C. H. Samans, Standard Oil Co., Chicago, '53.
G. V. Smith, United States Steel Co., Research Laboratory, Kearney, N. J., '55.
J. W. Spretnak, Ohio State University, Columbus, Ohio, '54.

Educational Committee

M. J. Day, Armour Research Foundation, Chicago, Chairman, '53.
A. M. Bounds, Superior Tube Co., Norristown, Pa., '54.
W. J. Buechling, Copperweld Steel Co., Warren, Ohio, '55.
J. M. Edge, Tennessee Coal & Iron Co., Birmingham, Ala., '55.
N. C. Jessen, Babcock & Wilcox Co., '54.
C. H. Lorig, Battelle Memorial Institute, Columbus, Ohio, '54.
F. G. Tatnall, Baldwin Locomotive Works, Philadelphia, '53.
R. F. Thomson, General Motors Corp., Detroit, '53.
Otto Zmeskal, Illinois Institute of Technology, '54.

Metal Progress Advisory Committee

E. E. Thum, Editor, *Metal Progress*, Cleveland.
R. L. Wilson, President, A.S.M.
James Austin, Vice-President, A.S.M.
W. H. Eisenman, Secretary, A.S.M.
R. T. Bayless, Assistant Secretary, A.S.M.
F. S. Badger, Haynes Stellite Co., Kokomo, Ind., '54.
John J. Christie, Handy-Harmon Co., Bridgeport, Conn., '55.
L. S. Fletcher, Sam Tour & Co., New York City, '54.
F. G. Norris, Wheeling Steel Corp., Pittsburgh, '53.
Roy G. Roshong, Heintz Manufacturing Co., Philadelphia, '55.
Leo Schapiro, Douglas Aircraft Co., Santa Monica, Calif., '54.

Advisory Committee on Metallurgical Education

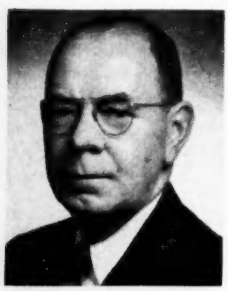
W. O. Philbrook, Carnegie Institute of Technology, Chairman, '53.
Alfred Bornemann, Stevens Institute of Technology, Hoboken, N. J., '53.
D. S. Eppelsheimer, Missouri School of Mines, Rolla, Mo., '53.
Frank Forward, University of British Columbia, Vancouver, '55.
J. C. Holmberg, Douglas Aircraft Co., Tulsa, Okla., '55.
J. L. Libsch, Lehigh University, Bethlehem, Pa., '54.
W. E. Mahin, Armour Research Foundation, Chicago, '54.
J. P. Nielsen, New York University, New York City, '54.
Amos Shaler, Massachusetts Institute of Technology, Cambridge, '55.
E. C. Wright, University of Alabama, University, Ala., '53.
J. B. Austin, Representative of the A.S.M. Board of Trustees.

Vocational Education Committee

W. F. Collins, United-Carr Fastener Co., Cambridge, Mass., Chairman, '53.
Alfred Bornemann, Stevens Institute of Technology, Hoboken, N. J., '55.
G. F. Kappelt, Bell Aircraft Corp., Buffalo, N. Y., '54.
W. J. Kinderman, Yarnall-Waring Co., Philadelphia, '55.
Arthur R. Kommel, United Engineering and Foundry Co., Vandergrift, Pa., '54.
R. C. Onan, Lindberg Engineering Co., Milwaukee, Wis., '54.
S. R. Prance, Inland Mfg. Division, General Motors Corp., Dayton, Ohio, '53.
W. C. Schulte, Curtiss-Wright Corp., Caldwell, N. J., '55.
W. O. Philbrook, Carnegie Institute of Technology (ex officio).
John Chipman, Representative of the A.S.M. Board of Trustees.

Metals Handbook Committee

E. O. Dixon, Ladish Co., Cudahy, Wis., Chairman, '53.
Taylor Lyman, A.S.M., Secretary.
O. E. Cullen, Surface Combustion Corp., Toledo, Ohio, '54.
T. E. Eagan, Cooper Bessemer Corp., Grove City, Pa., '54.
B. W. Gonser, Battelle Memorial Institute, Columbus, Ohio, '54.
Max Hansen, Illinois Institute of Technology, Chicago, '54.
Paul Moss, Eaton Manufacturing Co., Saginaw, Mich., '53.
N. E. Promisel, Navy Bureau of Aeronautics, Washington, D. C., '54.
Larry E. Simon, Electromotive Div., General Motors Corp., Chicago, '55.
Robert Sergeson, Rotary Electric Steel Co., Detroit, Mich., '54.
R. L. Swett, Michigan State College, East Lansing, Mich., '53.
S. F. Urban, Titanium Alloy Manufacturing Division, Buffalo, '55.
L. H. Winkler, Bethlehem Steel Co., Bethlehem, Pa., '54.



W. F. Collins

W. E. Mahin

W. O. Philbrook

M. J. Day

These Men Are the Newly Appointed Chairmen of the Following A.S.M. Standing Committees; W. F. Collins, Vocational Education Committee; W. E. Mahin, Publications Committee; W. O. Philbrook, Advisory Committee on Metallurgical Education; and Maurice J. Day, Educational Committee. A picture of H. E. Flanders, newly appointed chairman of the Constitution and By-Laws Committee, is shown on page 217

Rhode Island Makes Plant Visit to Foxboro

Reported by Warren M. Hagist
University of Rhode Island

Forty-five members of the Rhode Island Chapter visited the Foxboro Co., Foxboro, Mass., during the October meeting. They traced the company's complete process, from raw material to finished product on an extensive trip through the plant.

After the tour the members met in the company's cafeteria where M. R. Hall, director of education and training at Foxboro, and William LaPlante, metallurgist, gave short talks. Mr. LaPlante spoke on "Metallurgical Problems at Foxboro", describing in detail the metallurgical facilities of the company and how they are used in manufacturing instruments.

Course on the Tools Of Metallurgy Being Given by Rochester

The Rochester Chapter A.S.M. is currently conducting an educational course of ten lectures on the "Tools of Metallurgy". The course covers a description of the tools, method of application, and interpretation of results; mechanical testing, metallographic examination, and nondestructive testing and inspection methods. Each lecture is being supplemented by films, slides and trade literature.

The lectures, which are being given by Richard F. Eisenberg, assistant professor of metallurgy at the University of Rochester, are held at the University. Dates of the individual lectures are: Nov. 5, 12, and 19; Dec. 3, 10, and 17; Jan. 7, 14, 21, and 28.

Ten Years Ago

Quotes From *Metals Review* November 1942

Hailing from all parts of Georgia, 100 men who work with metals . . . met in Atlanta on Nov. 2 to complete organization of the Georgia Chapter of the American Society for Metals.

Speakers at ABCOR Meeting at Oak Ridge

Speakers at the ABCOR Regional Meeting of the Atlanta, Birmingham, Chattanooga, and Oak Ridge Chapters Which Was Held at Oak Ridge National Laboratory Sept. 18-19 Included, From Left: Joseph E. Burke, Director of Metalllurgy Division, Knolls Atomic Power Laboratory, D. S. Billington, Director, Physics of Solids Division, Oak Ridge National Laboratory, and G. E. Evans, Physics Division, O.R.N.L. With the speakers are L. K. Jetter, metallurgy division, O.R.N.L. and A. deS. Brasunas, University of Tennessee

Reported by G. M. Slaughter and E. E. Hoffman

Metallurgists, Oak Ridge National Laboratory

An ABCOR Regional Meeting of the Atlanta, Birmingham, Chattanooga, and Oak Ridge Chapters A.S.M. was held in Oak Ridge on Sept. 18 and 19. The theme of the meeting was "Nuclear Energy and Its Unique Metallurgical Problems"; it consisted of a series of lectures by several outstanding men in the atomic energy field. Guided tours of the graphite pile building, radioisotopes area, solid states division, and other facilities of the Oak Ridge National Laboratory and the Museum of Atomic Energy at Oak Ridge were included. The meeting was well attended by members of the participating chapters and members of six other chapters.

The welcoming address was presented by John H. Frye, Jr., director of the metallurgy division at Oak Ridge. Although discussion of the work at Oak Ridge is difficult because of the secrecy necessarily involved, Dr. Frye gave some interesting highlights on the development of the city itself, on the organizational structure of the Atomic Energy Commission, and on the various types of unclassified research being conducted in the metallurgy division.

A discussion of "Metallurgical Problems in Atomic Energy" by Joseph E. Burke, director of the metallurgy division at the Knolls Atomic Power Laboratory, was presented as the first lecture of the technical session. Dr. Burke stated that a reactor core consists of a fuel, moderator, structural materials, control unit, and a means for removing heat. The materials to be used in each component may require combinations of physical, chemical, nuclear and mechanical properties which are not commonly found in industry today, and thus the metallurgist has a very important position in reactor design.

The heart of the reactor is the fuel. One gram of uranium contains about 24,000 kw-hr. of available energy or is equal to approximately that of 3.3 tons of coal. The fuel, after being placed in the reactor core, is subject to several factors affecting its efficient operation. Among these are: Corrosion and erosion from the surrounding media; thermal stresses and fatigue; diffusion between the fuel and its cladding; radiation effects; and changes in composition resulting from fission. Also, since the fuel will be eventually used up during fission, the subsequent recovery and chemical processing of the various products is an important process.

The second lecture was on "Factors in Reactor Materials Selection" by George E. Evans, physics division, Oak Ridge National Laboratory. Since the physical size, power level, operating pressure, and operating temperature are so widely variable in reactor design, the problems of the metallurgist are multiplied when determining suitable reactor materials. Such factors as strength, corrosion resistance, and formability are encountered, and in addition there are new problems unique to the field of reactor engineering. These unique problems are of three main types: Problems associated with neutron economy; problems associated with radioactivity; and problems associated with radiation damage.

The central problem of neutron economy is to utilize the available neutrons in the most profitable manner. For a thermal reactor, this implies that nonfissionable materials present in the core should have low neutron absorption cross sections. Very expensive chemical separations may be necessary to obtain the required high-purity, low cross section materials.

The intense radioactivity within a reactor introduces problems of shielding, and severely complicates repair and maintenance. Since any material placed within the reactor will become radioactive, materials which must be handled should have low activation if possible.

A quick survey of common metals and alloys reveals that there are only four metals which have melting points above 500° C. and absorption cross sections below 1 barn; these are beryllium, magnesium, zirconium and aluminum. Structural materials of higher neutron absorption cross section can be employed when required by physical property specifications, at the expense of increasing the amount of fuel.

"The Effect of Nuclear Reactor Radiation on the Properties of Metals" was the subject of the lecture given by Douglas S. Billington, director of the solid states division, Oak Ridge National Laboratory. Since a neutron has no charge, it is often able to penetrate into the very nucleus of the atom. As an example, copper atoms may be transformed into zinc by collision and capture.

Large amounts of heat may be evolved in neutron bombardment and extremely drastic "quenches" may be obtained. As a result of radiation, annealed copper, and most other metals, increase in hardness. Stress-strain curves of samples of copper exposed to varying amounts of radiation indicate that radiation effects are similar to those resulting from alloying rather than those resulting from cold work.

Alloys of 50% copper and 50% gold by weight, which were irradiated in the ordered and disordered state, were studied by means of electrical resistivity measurements. The ordered solid solution apparently became disordered since the resistivity increased, but the disordered solid s o l u t i o n showed no change.

The effect of radiation on a beryllium-copper alloy, which is subject to precipitation hardening, seemed to be equivalent to a very low temperature aging treatment. This is again probably due to the existence of thermal "spikes" encountered in the bombardment process.

Lattice Model Presented To University of Penn.

The large model of a face-centered cubic lattice with an annealing twin which was exhibited in the Commercial Museum in Philadelphia during the National Metal Exposition in October has been presented to the Towne Scientific School of the University of Pennsylvania. It has been mounted in the main lecture room at the school with a card acknowledging the contribution from the American Society for Metals.

R. M. Brick, director of the school, feels that the model will be of decorative as well as instructional value to the students at the school.

Lists Important Factors in Selection of Toolsteels

Reported by Kenneth E. Rose
University of Kansas

George A. Roberts, chief metallurgist for Vanadium-Alloys Steel Co., explained several important factors in the "Selection of Toolsteels" at the September meeting of the Kansas City Chapter.

Toughness and wear resistance are the discriminating variables in choosing one particular toolsteel from the many compositions available.

Toughness can be improved by reducing the carbon percentage, but hardness and wear resistance generally depend on high carbon. A satisfactory compromise is often possible by using a steel with just enough hardenability to provide a hard, wear resistant outer zone, but leave the core incompletely hardened and somewhat tougher. Toolsteels even in the plain carbon grades can be purchased to assure predictable depth hardening characteristics within $\frac{1}{64}$ in. of the desired value.

Wear resistance is affected by the working temperature of the tool. At room temperature or slightly above, wear resistance is improved by increasing the carbon content. However, at elevated temperatures, carbon alone is not enough; it is necessary to add other elements which can form more durable carbides with the available carbon. Tungsten and chromium are used for this purpose in most hot working grades of toolsteel.

In the high speed steels, the 18-4-1 type has been largely superseded by an alloy containing approximately 6% W, 4% Cr, 2% V, and 5% Mo, which accounts for more than two-thirds the high speed steel made today, according to Dr. Roberts. Test results have indicated that this Mo-bearing steel is equal to the more expensive 18-4-1 in most physical properties, and is superior from the standpoint of ductility.

Cobalt is added to high speed types to increase the hot hardness. Vanadium is used to increase wear resistance because of the great affinity of vanadium for carbon, and because vanadium carbide is the hardest of the several varieties of carbide that are ordinarily found in toolsteels.

Case hardening of high speed steels may be accomplished by heating the tool in charcoal for 20 to 30 min. at 1950° F. Several tempering operations may be required to develop the maximum rim hardness in the carburized zone.

Factors Dictating the Selection of Metals Theme of Ottowa Course

The Ottawa Valley Chapter A.S.M. has just completed an educational course for the 1952-53 season on "Factors Dictating the Selection of Metals". Metals and alloys were discussed in groups based on physical and chemical properties (weight and corrosion resistance), rather than on chemcial analyses (copper based and aluminum based). The course was intended to help the majority of engineers or technicians who are daily confronted with the selection of metals to do a specific job.

The course, which was held on Monday evenings in the Conference Room of the Physical Metallurgy Research Laboratories, Mines Branch, Ottawa, consisted of the following lectures:

Oct. 27—"Factors Dictating the Selection of Metals", by G. Taylor, Royal Canadian Navy.

Nov. 10 — "Selection of Metals Where Wear and Abrasion Are Major Considerations", by D. A. Scott, International Nickel Co., Ltd.

Nov. 17 — "Selection of Metals Where Weight is a Major Consideration", by D. W. Stewart, Renfrew, Ont.

Nov. 24 — "Selection of Metals Where Corrosion Resistance is a Major Consideration", by Bruce F. Richardson, Steel Castings Institute of Canada.

Dec. 8 — "Selection of Metals Where Service Temperature is a Major Consideration", by T. V. Simpkinson, Physical Metallurgist, Mines Branch.

Dec. 15 — "Selection of Metals Where Electrical and Magnetic Properties Are Major Considerations", by J. O. Edwards, Mines Branch.

Vilella Speaks in Dayton

Reported by D. F. Gerstle
General Processes
Delco Products Div.

The October meeting of the Dayton Chapter featured J. R. Vilella, research metallurgist at the Research Laboratory, U. S. Steel Co., Kearney, N. J. Mr. Vilella spoke on the "Metallographic Technique for Steel" and his informative talk was well received by all members present.

Crucible Starts New Ovens

The Midland Works of Crucible Steel Co. of America put 29 new coke ovens, which will produce about 157,000 tons of coke for use in steel production annually, into operation last month. The new ovens will increase the company's annual coke output to 832,000 tons, and materially step up production at the coke plant chemicals division.

Rocky Mt.-Pueblo Group Entertains Past Chairmen

The Rocky Mountain Chapter, Pueblo Group, Held Its First Past Chairmen's Night in October. Eight of the Chapter's 12 past chairmen who were present at the meeting are shown here. They are, from left: Oscar Hed; Carl Gustafson; V. W. Johnson; John R. Zadra; Byron E. Cohn, speaker; Irving Herts; Howell Drummond; Harold Gumma; and Walter Munn. Dr. Cohn, a member of the scientific advisory board of the Harvard-Colorado High-Altitude Observatory, spoke on "Cosmic Ray and Cloud Chamber Activities at the High-Altitude Laboratory on Mt. Evans, Colo." The laboratory is at an elevation of over 14,000 ft.

Eastern New York Hears of Recent Rolling Developments

Reported by John M. Gerken
Research Associate
Rensselaer Polytechnic Institute

A discourse on "New Developments in Rolling" was presented by James F. Fox at the September meeting of the Eastern New York Chapter. Mr. Fox has been associated with the Armzen Co. since 1945 as mechanical engineer in charge of hot Sendzimir mill activities.

Mr. Fox explained the operating principles of the hot Sendzimir or planetary rolling mill. This is a single stand, single-direction mill, reducing slabs or ingots to strip in one pass. It consists of two large backing rolls around the periphery of which are spaced a number of planetary work rolls. These rolls are held in position by cages similar to roller bearing retainer rings. The cages are geared to run in synchronism so that top and bottom rolls will engage the material being rolled exactly opposite. The mill has a hydraulic ram or pair of feed rolls which forces the workpiece through. This feeding action offers the advantage of subjecting the material to "all sided" compression in the roll bite, thus making possible drastic reductions from slab thicknesses to strip in one single pass through the mill, even on relatively brittle materials, where ordinarily several light passes are employed to guard against fracturing and damage in the reduction zone. Reductions of 20 to 1 are possible with the Sendzimir mill.

This mill offers advantages to small and large producers alike. For the former it is a low-cost (initial and operational) basic strip producer, and may be used as an economical specialty strip producer augmenting the conventional equipment bound to standard production.

Talks on Metal Powders at Worcester

The October Meeting of the Worcester Chapter Consisted of a Visit to the Presmet Corp. Where Structural Parts Are Made by the Powder Metallurgy Process. Later in the day, Carl G. Johnson, associate professor of mechanical engineering, Worcester Polytechnical Institute, and vice-president of Presmet, spoke on "Manufacture of Structural Parts From Metal Powders". In attendance were, from left: Harold J. Elmendorf, American Steel & Wire Co., vice-chairman; W. B. Dennen, director of Worcester Boys' Trade High School, executive committee member; Prof. Johnson; and W. J. Johnson, chapter chairman. (Photo by C. W. Russell)

Buffalo Chapter Visits Stamping Plant

Reported by A. E. Leach
Metallurgical Engineer
Bell Aircraft Co.

Almost 200 members of the Buffalo Chapter participated in the annual plant visitation on Oct. 9 to the Buffalo Stamping Plant of the Ford Motor Co. This plant, which started production in 1950, and its construction embody many advances over older plants in automatic handling and integrated stamping.

A wide variety of body parts was seen passing from one press to another without being touched by workmen until they became finished products. Stamping and blanking presses, conveyors and handling devices were synchronized and operated by central control panels.

The visitors were impressed by the safety measures practiced in the plant. For instance, a rule that requires safety glasses to be worn by everyone on the plant floor has practically eliminated eye accidents.

Steel "Peddler" Goes to Texas

Earle M. Jorgensen (Second From Left) Spoke Before the Texas Chapter in October, Presenting His Talk on "Reminiscences of a Steel Peddler". Mr. Jorgensen is chairman of the board and president of the Earle M. Jorgensen Co., Los Angeles. Since his "Reminiscences" were reported in the March issue (p. 17), they will not be reprinted. With Mr. Jorgensen are, from left: A. R. Oakley, Jr., sales metallurgist, Steel and Machine Tool Sales, secretary-treasurer; Mr. Jorgensen; Milton W. Phair, salesman, T. C. & I. Division, U. S. Steel Co., chapter chairman; and W. Mack Crook, consulting engineer, vice-chairman. (Photograph by L. V. Dolan)

Two-Year Program on Steel Inagurated in Ontario

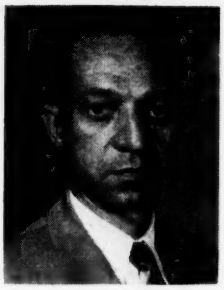
Reported by C. G. Robinson
Aluminum Co. of Canada, Ltd.

A two-year program on the basic metallurgy of "Steel—From Ore to the Mill" was inaugurated by the Western Ontario Chapter A.S.M. during the initial meeting of the 1952-53 season, held jointly with the local chapter of the Canadian Welding Society. The meeting featured J. C. Snedden, service metallurgist with the Steel Co. of Canada, as guest speaker. He illustrated his discussion with a series of exceptionally fine color slides taken at the Steel Co. of Canada.

Sierra Opens New Plant

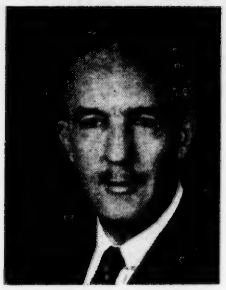
The Sierra Drawn Steel Corp. of Los Angeles has recently established a mill in Seattle, Wash., capable of handling cold finished bars from 1½ to 6 in. It will be known as Sierra Drawn Steel Corp. of the Northwest.

Meet Your Chapter Chairman



J. G. Cametti

M. W. Phair



Hal Bleakney

TEXAS

MILTON W. PHAIR was born in June 1909, in Hempstead, Texas, 50 miles from Houston. He is the grandson of a Methodist minister, and son of a railroad engineer. He attended Metropolitan Business College in Dallas, and Tulane University, New Orleans.

Milton has been a member of A.S.M. for 15 years. He has been employed by the Tennessee Coal & Iron Division of the United States Steel Co. for 25 years, and has worked in Houston all this time except for three years spent in the New Orleans office. He is presently a sales representative.

Mr. Phair and his wife have two children, Glenda Gay, 9, and Milton, Jr., 5. His chief hobby is golf; he has been playing regularly each week with the same foursome for the past ten years, and he also frequently plays golf with his wife, Daisy. He like to fish and hunt, when time allows.

KANSAS CITY

J. G. CAMETTI, chairman of the Kansas City Chapter A.S.M., was born in Iowa in 1915, but his family moved to Pennsylvania when he was small. In 1933 he started evening school at Carnegie Institute of Technology, Pittsburgh, and received his B. S. degree from the Institute 13 years later. His entire schooling was obtained at evening classes 3 or 4 nights a week, commuting approximately 60 miles per evening.

Jim and Eleanor, his wife, have two children, Richard, 10, and Elaine, 8, both of whom are good fishermen "like their daddy". He joined Westinghouse Electric Corp., East Pittsburgh, in 1937. After completing the apprenticeship course he joined the material engineering division where he remained until 1949. Most of his time was spent in developing metallurgical processes related to atmosphere controlled furnaces and casting processes. This work led to the successful establishment of a precision casting pilot plant, of which he was in charge when he left in 1949 to establish a precision casting facility in the naval reserve plant at Kansas City, Mo., in a move toward greater production of Westinghouse aviation gas turbines. This plant began operating in 1950.

Jim is a member of the A.F.S., and was vice-chairman of the Kansas City Chapter A.S.M. in 1951-52. He is active in church organizations, and is a member of the executive committee for cub scouting. He thoroughly enjoys fishing and is willing to travel many miles to get to a "good spot". He enjoys gardening but reverts back to his first love, fishing, the first time a worm turns in his garden. He plays golf occasionally, shooting in the 90's.

OTTAWA VALLEY

HAL BLEAKNEY says it is quite true that a rolling stone gathers no moss, but he also says that stationary stones miss a lot of fun. Since graduating from Queen's University in 1922 with a B.Sc in metallurgy, he has had about 15 different jobs, ranging from third helper in the open-hearth at Pittsburgh Crucible Steel to chief metallurgist of the Federal Foundries and Steel Co. of London, Ont. During that time, besides satisfying a keen curiosity about steel and metal processes, he acquired quite a store of experience—his colleagues say he is a handy fellow to have around when metallurgical problems arise.

In 1946, at the age of 46, he married Aileen Brodie, of Hamilton, Ont. Deciding that he had found what he was looking for, he gave over the nomadic life and settled down in his home town as a senior scientist with the Department of Mines and Technical Surveys in Ottawa. He is particularly interested in studying the various aspects of the fracture of metals, and has recently completed a paper on the "Ductility of Metals in Creep-Rupture Tests".

His principal hobbies are playing golf at the Larrimac Golf Club, of which he is a director; building a cottage overlooking the Gatineau River right next to the golf club; and serving Ottawa Valley Chapter.

Hal travelled in Norway, Germany, Paris and London in spring and early summer, 1935. He is a 25-year member of A.S.M., and has belonged to the Pittsburgh, the Chicago, the Montreal, the Philadelphia, and the Ontario chapters.

WORCESTER

WENDELL J. JOHNSON was born in 1908. He is married and has two boys, Peter and Paul. He loves to fish and garden, and takes a keen interest in local, state and national affairs.

He graduated in 1934 from Clark University, where he majored in economics and history. He taught in Worcester public high schools for 11½ years and was a supervisor in the adult educational programs in Worcester for three years. He has been a coteacher in an adult course in the study of metals for 12 years at Worcester Tech at night.

Wendell has been an assistant camp director and senior camp director for the Y.M.C.A. summer camps in Worcester for eight years. He is a past president of Men's Republican Club and of the Young Men's Republican Club of Greater Worcester, is a 32nd degree Mason and Shriner, as well as a member of various Swedish professional clubs.

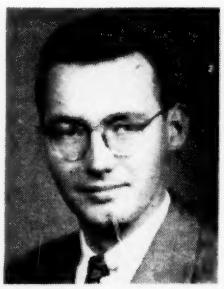
He is presently employed as sales

(*Continued on p.* 13)

W. J. Johnson

D. W. Thompson

J. E. DeMoss



manager of the Massachusetts Steel Treating Corp., and is on the board of directors of the company.

FORT WAYNE

DEAN W. THOMPSON, was born in Illinois in 1919. He graduated in 1942 from Colorado School of Mines and Metallurgy with a degree in metallurgical engineering. His wife, Jane, and he have two children, Susan Jane, 8½, and Kenneth, 6. He was a captain in the Air Force during the war, and served as squadron engineering officer, light and medium bombardment aircraft, in the European Theater.

Dean is in his seventh year of employment with the General Electric Co., and is presently head of the metallurgical section of the company's Fort Wayne works laboratory.

Dean says he is a typical "weekend" golfer. He enjoys family vacations with plenty of swimming weather and facilities. His son has recently coerced him into the conclusion that fishing "might prove entertaining". He has an avid interest in all major sports, although this interest is now confined to that of a spectator. He states that where varsity basketball was once a challenge, he now finds equal challenge in holding his own with 8-year old kids in a game of "barnyard 21". He is highly partial to Colorado climate and general outdoor environment, and enjoys bridge under all circumstances.

Notre Dame

JOHN E. DEMOSS was born in Chicago in 1918, and attended elementary and high schools there and in Oak Park. He received his B. S. degree in chemical engineering from Notre Dame University in 1940, and his M.S. degree in metallurgy from Massachusetts Institute of Technology in 1942. He returned to Notre Dame for further graduate study as an O'Brien Fellow in Metallurgy. From late 1942 to 1944 he was research engineer on the O.S.R.D. gun steel research project at Notre Dame, and at the expiration of this work was appointed instructor in metallurgy at the university. In 1949 he was made an assistant professor of metallurgy, the position he now holds.

He was married in 1942 and he and his wife, Josèphine, have three children, two girls and a boy. His favorite hobbies are hunting, fishing, gardening and photography.

He is a member of the A.I.M.E., and Sigma Xi, and has served several terms on the nominating and executive committees of the Notre Dame Chapter A.S.M., and on a number of committees at the university. He is a registered professional engineer and has done considerable consulting work.

He has had papers published in the *Transactions* of both the A.S.M. and A.I.M.E.

Washington Holds Quench and Draw Party

Part of the Crowd of 200 Members and Guests Who Attended the Third Annual Quench and Draw Party at the October Meeting of the Washington Chapter

Reported by J. H. Schaum
National Bureau of Standards

The Washington Chapter had its 3rd annual Quench and Draw Party on Oct. 13. Over 200 members and guests came to be cured of research fatigue, metallurgical ossification and bureaucratic rigor mortis.

The first stage of transforming the equilibrium of this work hardened group was a solution treatment designed to produce relaxation and homogenization by a rapid quench in hypereutectic beer. After a short holding time in this iso-alcoholic atmosphere, most of the men were ready to determine their respective moduli of elasticity at a continuous self-service buffet of spiced shrimp, roast turkey, roast beef, ham, and trimmings.

After their liquidus and solidus was thus determined, the environment was changed into a Monte Carlo Casino with roulette, pinwheels, chuck-a-luck, galloping dominoes and tiddly winks. Everyone was given hundreds of dollars of "Confederate" greenbacks with which to test Hooke's Law and Poisson's ratio. The gaming tables were closed down after many of the players had been properly tempered and their holdings spheroidized.

As a grand finale came the traditional auction of prizes galore. Using the counterfeit lucre won at the gaming tables, the yield point of the bidders was determined, and everyone was sent home for normalizing.

Baldwin Nominated to Post With National Research Council

William M. Baldwin, Jr., research professor, Case Institute of Technology, has been nominated as the representative of the American Society for Metals to the Division of Engineering and Industrial Research of the National Research Council. Dr. Baldwin has been officially appointed to the Council for a period of three years.

Dr. Baldwin was born in Buffalo in 1915. He graduated from Rensselaer Polytechnic Institute in 1936 with a degree in chemical engineering and continued his studies at the University of Munich, Germany, Federal Polytechnic Institute, Switzerland, and Case Institute of Technology, Cleveland, receiving his M.S. degree in 1941 and Ph.D. degree in 1945 from the latter.

From 1938 to 1948 Dr. Baldwin was associated with Chase Brass & Copper Co., Inc., Cleveland, as a metallurgical engineer. In July 1948, he became research professor in the department of metallurgical engineering at Case. He is the author of a number of technical papers, one of which earned him the Annual Award in 1945 of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers. In June 1949 he delivered the Edgar Marburg Lecture before the annual convention of the American Society for Testing Materials.

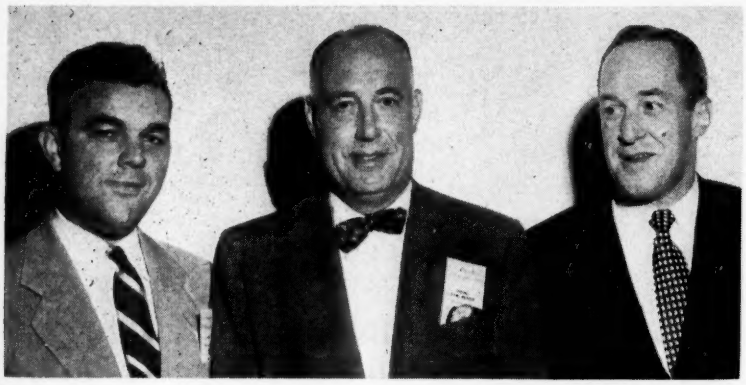
Dr. Baldwin was the editor of *Proceedings* of the First World Metallurgical Congress published by the American Society for Metals in 1952.

Anaconda Expands

Anaconda Copper Mining Co. has announced completion of the organization of its subsidiary, Anaconda Aluminum Co. (formerly Harvey Machine Co., Inc. of Montana). Francis O. Case, a vice-president of Anaconda Copper Mining Co., has been elected president of Anaconda Aluminum Co.

The aluminum reduction plant will be built near Columbia Falls, at the base of Teakettle Mountain, in Flathead County, Mont.

L.A. Hears Talk on Carbon Steel Bars



John R. Killmer (Center), Metallurgical Engineer, Bethlehem Steel Co. Spoke on "Application of Types and Grades of Carbon Steel Bars" at the September Meeting in Los Angeles. With Mr. Killmer are R. J. Tremblay (left), technical chairman, and J. A. Chalk, Jr., vice-chairman. Both Mr. Tremblay and Mr. Chalk are with Bethlehem Pacific Coast Steel Co.

Reported by N. F. Vinatieri
Ducommun Metals & Supply Co.

Los Angeles Chapter commenced this year's activities in September by hearing John K. Killmer of Bethlehem Steel Co. talk on "The Application of Types and Grades of Carbon Steel Bars". Mr. Killmer has been a metallurgical engineer on carbon steel bars for Bethlehem Steel since 1938.

In selecting a steel for a specific application, the following must be considered: the requirement of the end product; the allowance of a sufficient factor of safety, the manufacturing facilities available; and the cost of raw material. The steel that offers the most economical combination of these considerations is the one to use. Of importance also is the availability from either mill or warehouse source; it is advisable to select, insofar as possible, a standard steel. Mr. Killmer noted that ten A.I.S.I.-S.A.E. grades of carbon bar steels account for 75% of the total industry production.

Mr. Killmer discussed the four types of steel commonly produced in bar form, namely, rimmed, capped, semikilled and killed, the latter in both coarse and fine grain, explaining briefly their methods of production and general characteristics.

He considered the various A.I.S.I.-S.A.E. grades in the following categories: low carbon, low manganese; low carbon, intermediate manganese; low carbon, high manganese; intermediate carbon, low manganese; intermediate carbon, medium manganese; and intermediate carbon, high manganese.

This grouping covers both normal and resulphurized steels. In each of these groupings the various types of steel, both coarse and fine-grained, were discussed as to their hot and cold fabricating characteristics, machining properties, and their heat treating features. By studying these data and knowing the end use requirements, the most economical grade and type of steel can be selected. Many times the cheaper grade and type of steel will not result in the cheapest finished product.

The speaker pointed out that the production of bessemer screw stock is on the wane, and that C-1211, C-1212 and C-1213 steels are in a large part replacing B-1111, B-1112 and B-1113 steels. These new steels are produced either in the open-hearth or the electric furnace, and are designed to have the same excellent machining properties as previously obtained in the grades produced in the bessemer converter.

Speaker Outlines Program for Inspection And Control Techniques

Reported by K. W. Shaw
Assistant General Manager
Imperial Oxygen, Ltd.

W. E. Bancroft, chief metallurgist at the Pratt & Whitney Division of Niles-Bement-Pond Co., gave a talk on "Metallurgical Inspection and Control" at the first monthly meeting of the 1952-53 season of the Montreal Chapter. He gave an interesting description of the metallurgy practiced at his company, and made considerable reference to metallurgical control.

Mr. Bancroft outlined the need for metallurgical inspection and control to insure good and uniform quality in finished products and to help reduce manufacturing costs through screening out faulty material before expensive operations have been performed. Just how extensive inspection should be is dependent on the type of service in which the product is intended to perform. Certain parts having severe and critical initial requirements deserve more metallurgical attention than others.

The metallurgist is not only responsible for the quality of raw material, but he is also expected to see that the material behaves properly at all stages of manufacturing, particularly during heat treating.

Mr. Bancroft stated his company's metallurgical philosophy as an ideally complete program for metallurgical inspection and control. It consists of six elements: contact with vendors; adequate but reasonable specifications; laboratory inspection of raw materials; trouble shooting in shop operations; control of heat treating operations; and analysis of field performance of products.

Wear and Abrasion of Tungsten Carbide Subject Of Tri-City Lecture

Reported by Keith V. Mercer
Minneapolis-Moline Co.

An interesting film showing the manufacture of sintered tungsten carbide and some of the applications to which this product is best suited was shown at the October meeting of the Tri-City Chapter.

Following this film, Roy D. Haworth, Jr., manager of product development for the Carmet Division of Allegheny Ludlum Steel Corp., spoke on "Wear, Abrasion and Related Problems". He pointed out that although tungsten carbide is much more expensive than steel, it more than pays for itself in extending the life of the part. This is particularly true in extremely abrasive uses. It is not uncommon to find that the tungsten carbide part outwears a like part made of steel 15 or 25 to 1. Thus, much "down time" for changing parts is eliminated.

By the use of slides, Mr. Haworth showed that a higher hardness does not always improve wear resistance in low-alloy steels. Abrasive wear is influenced by the size, shape and hardness of the abrasive grains. Sharp angular grains may produce more wear than rounded ones of somewhat higher hardness.

Present-day prices of tungsten carbide are so much lower than in 1929, that today it is practical and economical to use in many wear and abrasion applications.

Crystal Growth Explained by Speaker At Southern Tier

Reported by James M. Copeland
Assistant Metallurgist
International Business Machines Corp.

John Fisher, manager of the physical metallurgy section of General Electric Co.'s research laboratory, Schenectady, discussed "Crystal Growth" at the October meeting of the Southern Tier Chapter.

His lecture included colored motion pictures and a model demonstration illustrating the Frank dislocation theory of crystalline growth. He pointed out that, until the advent of the Frank hypothesis, two apparently contradictory factors were present in the thinking concerning growth of a crystal. It was realized that the nucleation process was involved in the growth or development of an additional layer on a given smooth crystalline face. However, because of the factors that opposed any random nucleation of ions or atoms on such a crystalline face, together with the laws of chance, it was improbable that crystalline growth would occur in any solution with a solute level less than 50% supersaturation. Yet, crystal growth occurred readily in the laboratory in solutions at levels of 1 to 2% supersaturation.

The Frank dislocation theory holds that local imperfections or dislocations nucleate crystalline growth. A rectangular sponge-rubber model with parallel marks, representing three horizontal monatomic layers or planes, was shown. A dislocation was made in the model by slitting the material in a vertical direction from the center to an outer edge and shearing one side of the model at the slit so that a step displacement equivalent to the depth of one layer was made. The model then, instead of representing three distinct monatomic layers, showed one layer running through the block as a spiral. Any additional growth was shown as originating at the step or discontinuity formed by the displacement on the model and forming a continuation of the spiral.

Mr. Fisher showed slides of several crystals which showed spiral-shaped patterns on their surfaces. Motion pictures showed the growth of cadmium iodide crystals. The photographs were made through a microscope attachment at approximately 100 magnifications at a speed 48 times the growth rates of the crystal. Crystal formation and growth were induced in a cadmium iodide solution supersaturated at 80° C. and cooled to 30° C. Crystals were seen growing in spiral patterns. Spirals were seen as originating at local imperfections or discontinuities and progressing in spiral-hexagonal patterns.

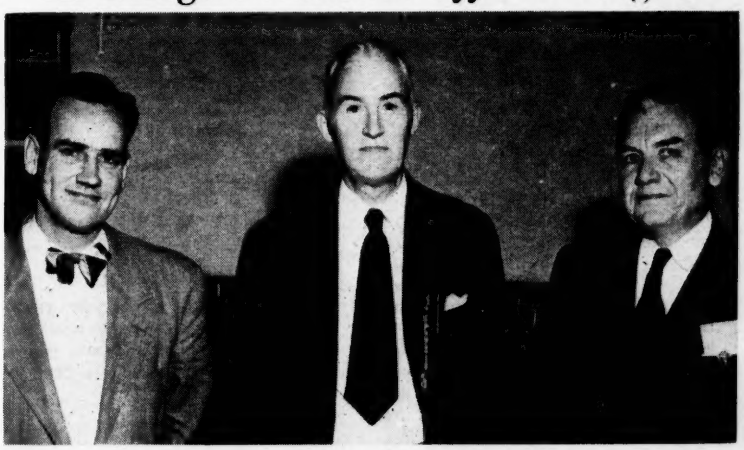
Such defects or dislocations were shown as extending as a line through a crystal. They can be considered as sometimes migrating through the crystals. An array of such difficulties might be thought to extend along a grain boundary.

The theory of dislocations with the concept of inherent crystal defects is useful in understanding crystal growth. It is also helpful in investigating the mechanism of crystal deformation and the mode of plastic flow. Some questions, however, merit additional investigation. For example, how do the crystal dislocations react with a precipitate such as carbon dissolved interstitially in iron?

The practical importance of the idea of dislocations and the understanding of the mechanics of crystal growth and deformation are suggested by calculations that show the theoretical tensile strength of perfect aluminum crystals to be on the order of 1,000,000 psi., of perfect iron crystals 2,000,000 or 3,000,000 psi, and perfect cadmium crystals 1,000,000 psi.

This field of research may suggest eventual means of increasing strength of materials.

At Lehigh's National Officers' Night



National Officers' Night Was Held in October by the Lehigh Valley Chapter. R. L. Wilson (center); A.S.M. president, is shown with W. N. Rice, chapter chairman (left), and M. W. Dalrymple, technical chairman (right). As Mr. Wilson's speech "Current Development in Alloy Construction Steels" will be given before a number of chapters during his term of office, it will not be published. (Reported by D. A. Lamb, Ingersoll-Rand Co.)

Wanted—Translators of Russian Technical Papers

The problem of making available to metals engineers the important metallurgical work being done in Russia today was considered at an informal meeting of metallurgists and librarians during the regional meetings of the Metals Section, Special Libraries Association, at the National Metal Congress last October. A study of this problem should be made to supplement current national and international surveys on translations of technical literature, according to A. G. Guy, associate professor of metallurgical engineering, Purdue University.

A significant factor in any plan to furnish translations of Russian papers is the number of specialists in the various fields of metallurgy who would be willing and able to cooperate in making the translations. Metallurgists with a moderate reading knowledge of Russian, who would be willing to translate about one paper a month, are asked to write to Dr. Guy, stating the fields of metallurgy in which they are qualified. Address communications to A. G. Guy, School of Chemical and Metallurgical Engineering, Purdue University, Lafayette, Ind.

Lehigh Valley Elects New Secretary and Treasurer

The transfer of Herbert Krohn to Chicago has necessitated election of new officers of the Lehigh Valley Chapter. Replacing Mr. Krohn as secretary-treasurer are: Norman H. Halliday, secretary; Frank H. Laxar, treasurer. The above men were elected at the regular monthly meeting of the Chapter in November.

Science Achievement Award Winners—1952

Following is a complete list of the award-winning entries in the 1952 program of the Science Achievement Awards for Students, sponsored by the American Society for Metals and conducted by the National Science Teachers Association. First-place awards are listed in boldface type.

A total of 80 awards in Defense Bonds and certificate awards were given, as follows:

To students of grades 7 to 10: four first-place awards of $100; eight second-place awards of $50; 10 honorable mention awards of $25. To students of grades 11 and 12: four first-place awards of $200; four second-place awards of $100; and ten honorable mention awards of $50, to junior and senior high-school teachers: 20 $50 awards.

Awards to schools: to science departments of schools whose students have won first and second-place awards, 8 first-place awards—$100, 12 second-place awards—$50.

Alabama

Kibbee Streetman, "My Experiments With Alpha, Beta, and Gamma Rays"; 14 years old; 9th grade, West End High School, Birmingham, Ala.

Arkansas

James Tatro, "A Slective Crystal Radio With Selective Aerial"; 14 years old; 9th grade, Ft. Smith Junior High School, Fort Smith, Ark. (Honorable Mention).

California

Douglas Junge, "Photomicrography Simplified"; 14 years old; 9th grade, Tracy Union High School, Tracy, Calif. (Second-Place Award).

Richard Williams and Reed Putnam, "Uranium 238 Atom Model"; 14 years old; 8th grade, Carmel High School, Carmel, Calif. (Honorable Mention).

Clifford DeLacy, "Fluorescence and Phosphorescence of Minerals"; 17 years old; 11th grade, Vallejo College School, Vallejo, Calif. (Second-Place Award).

Mario Antoci "Blast Furnace"; 17 years old; 12th grade, Cantwell High School, Montebello, Calif. (Honorable Mention).

Thomas Pariso, "Electroplating of Brass Materials"; 18 years old; 12th grade, Cantwell High School, Montebello, Calif. (Honorable Mention).

Dee Trepanier, "Periodic Classification of the Elements"; 17 years old; 12th grade, Cantwell High School, Montebello, Calif. (Honorable Mention).

Robert Montgomery, "A Modern Metal"; 16 years old; 12th grade, Alameda High School, Alameda, Calif. (Honorable Mention).

Florida

Norman Drucker, "Factors Involved in Soil Erosion"; 14 years old; 10th grade, Miami Beach High School, Fla. (Honorable Mention).

Indiana

Kirby V. Scherer, "My Experiments With Ultrasonics"; 16 years old; 10th grade, Bosse High School, Evansville, Ind. (Second - Place Award).

Bill Eykamp, "The Effects of Rarefied Atmosphere on Plants"; 15 years old; 10th grade, Bosse High School, Evansville, Ind. (Honorable Mention).

Lloyd Heldt, "Research Paper on Magnesium"; 17 years old; 12th grade, Benjamin Bosse School, Evansville, Ind. (Second-Place Award).

Nick Cromwell and Lloyd Heldt, "Electrolytic Sodium Cell"; 17 years old; 12th grade, Benjamin Bosse School, Evansville, Ind. (Honorable-Mention).

James Fleming, "Electrolysis of Sodium Hydroxide" ; 17 years old; 12th grade, F. J. Reitz School, Evansville, Ind. (Honorable-Mention).

Thomas Steele, "Tissue Culture of Chick Embryos"; 15 years old; 10th grade, Thomas Carr Howe School, Indianapolis, Ind. (Second-Place Award).

Kentucky

Mary Edna Voigt, "Pigments Obtained From Some Metallic Compounds"; 18 years old; 12th grade, Holy Rosary Academy, Louisville, Ky. (Second-Place Award).

Maryland

Don Boyle, "The Effect of Radio Waves on Seed Germination and Growth"; 15 years old; 10th grade, Northwestern High School, Hyattsville, Md.

Massachusetts

August Schomburg, "Can Titanium Be Lubricated?"; 16 years old; 10th grade, Watertown High School, Watertown, Mass. (Second-Place Award).

New Jersey

Eugene LeGoff, "The Synthesis of Metal-Organic Resins"; 17 years old; 12th grade, New Brunswick Senior High School, New Brunswick, N. J. (Honorable Mention).

New York

David Smith, "The Absorption of Beta Rays by Metal"; 17 years old; 12th grade, Mount Pleasant High School, Schenectady, N. Y.

John Broderson, "Paper Making"; 13 years old; 8th grade, Grant Junior High School, Syracuse, N. Y. (Second-Place Award).

Carol Myers, "Chick Embryology"; 13 years old; 9th grade, Canastota Central School, Canastota, N. Y. (Second-Place Award).

Melvin Goliger, "The Effects of Radiation of Moths"; 15 years old; 10th grade, Thomas Jefferson High School, Brooklyn, N. Y. (Second-Place Award).

Joan Mercurio, "Candle Research"; 13 years old; 9th grade, Grant Junior High School, Syracuse, N. Y. (Honorable Mention).

Francis Cusimano, "Construction of a Microprojector"; 15 years old; 10th grade, Cleveland Hill High School, Buffalo, N. Y. (Honorable Mention).

Norman Schaaf, "The Nervous System of Man"; 15 years old; 10th grade, Cleveland Hill High School, Buffalo, N. Y. (Honorable Mention).

Paul Levine, "An Ultra - Sensitive Miniature Capacitance Operated Relay and Its Use as a Steel Thickness Gauge"; 16 years old; 12th grade, Stuyvesant High School, New York, N. Y. (Honorable Mention).

Charles Hill and Arthur Arnson, "Electrical Resistance Furnace"; 17 years old; 11th grade, Lansingburg High School, North Troy, N. Y. (Honorable Mention).

Selma E. Kaplan, "The Rare Earths"; 16 years old; 11th grade, The Bronx High School of Science, New York, N. Y. (Honorable Mention).

Ohio

William Bayer, "A Three Dimensonal Graph"; 13 years old; 8th grade, Hawken School, Cleveland, Ohio. (Honorable Mention).

Sheridan Speeth, "Working Model of the Central Nervous System"; 14 years old; 9th grade, Wilbur Wright Junior High School, Cleveland, Ohio. (Honorable Mention).

Oregon

Donald Crothers, "Microphotography —The Cell, the Building of Nature"; 15 years old; 10th grade, Salem Senior High School, Salem, Ore. (Honorable Mention).

Pennsylvania

Richard Steyert, "Obtaining Magnesium From Sea Water"; 15 years old; 10th grade, Allentown High School, Allentown, Pa.

Texas

David Hinkle, "The Effect of Thyroid on Alcoholic Mice"; 16 years old; 10th grade, Austin High School, Austin, Tex. (Second-Place Award).

Peter Oliver, "Effect of Yeast on the Various Stages in Drosophila Melanogaster"; 15 years old; 10th grade, Austin High School, Austin, Tex. (Second-Place Award).

Virginia

Jane Black, "Eight Minerals and Their Commercial Uses"; 15 years old; 10th grade, James Monroe High School, Fredericksburg, Va. (Honorable Mention).

Wisconsin

Henry Fuller, "Electro-Tester for Carbon Content of Steel"; 16 years old; 11th grade, Shorewood High School, Shorewood, Wis.

Talks on Clad Metals in Rochester

Gilbert I. Clark (Center), Project Engineer, Kenney Co., Who Spoke on "Manufacture and Applications of Clad Metals" Before the October Meeting of the Rochester Chapter A.S.M., Illustrates His Talk With a Clad Metal Product. Shown with Mr. Clark are Norman Finsterwalder (left), Taylor Instrument Co., and Robert S. Guinan (right), of the Eastman Kodak Co.

Thanks Dr. Roller

The following letter was sent to W. H. Eisenman, A.S.M. secretary, by Philipp L. F. Roller of Rochling'sche Eisen- und Stahlwerke, Volklingen, Saar, just before the National Metal Congress and Exposition in Philadelphia. He was a conferee in Study Group 1 (Steelmaking and Refining) at the World Metallurgical Congress.

"To you and all members of A.S.M. my sincerest wishes for the 34th National Congress and Expositon. Just a year ago we took part in the 33rd National and World Metallurgical Congress in Detroit as guests of A.S.M. The cordial reception by all A.S.M. members and the visits to the chief steelmaking plants with their kind welcomes are not forgotten. We still have to work to realize the overwhelming technical impressions, and last, but not least, the human relations we saw all over your country.

"We can only wish that the Second World Metallurgical Congress will take place in the near future somewhere in Europe. All European conferees are surely anxious to give a good impression of our own steelworks as your guides and American people have done it. We hope that your American friends will not forget to see our Saar-Steelworks.

"For the 3th National Congress, a cordial Gluckauf."

Reported by Lacy M. Smith
Metallurgical Laboratory
Eastman Kodak Co.

The first meeting of the Rochester Chapter's 1952-53 season was keynoted on Oct. 13 with a lecture by Gilbert I. Clark. Mr. Clark, until recently plant and project engineer for the American Clad Metals Co. of Carnegie, Pa., and now project engineer of that company's sales affiliate, Joseph Kinney Co., spoke on "Manufacture and Applications of Clad Metals".

The lecture was a practical discussion of clad metals with emphasis on the products and "Kinney" processes of the American Clad Metals Co. In this cladding process, a sandwich of the base and cladding metals is placed in the cladding machine. This machine exerts high pressures on the sandwich, driving gases from between the carefully cleaned metallic interfaces to insure complete bonding during subsequent processing. While the metal is under pressure, the edges of the sandwich are heliarc welded. The welded sandwich is then hot rolled and cold finished to the desired thickness. Cladding metal may be applied to one or both sides of the base metal as required.

With the Kinney process of cladding, a wide variety of metals have been bonded and reduced successfully, including such combinations as copper and silver-clad aluminum, and silver-clad mild steel and stainless steel. Their main products, however, are stainless-steel-clad copper, and copper or copper-alloy-clad mild steel.

The proprietary material (Rosslyn metal) formed when copper is clad on both sides with stainless steel is valuable because of its excellent heat distributing properties. The evenness of heat distribution afforded by the center layer of copper has made this material an important factor in minimizing hot spot troubles in jet engines. In such application it has taken the place of expensive and scarce alloy steels.

Mr. Clark promised that when current restrictions on its use are lifted, Rosslyn metal will be available to give increased efficiency in home and industrial cooking, and in the field of heat exchangers as well.

Copper-clad steel (Electroshield) is finding wide use in the electrical field as shielding for electronic installations, as television waveguide tubing, and in electrical applications where high strength and high surface conductivity are required. Past emergency plans for this material include such uses as downspouts in the building trades, and radiator tanks in the automotive industry.

Flanders Gets Award for Arc Welding Paper

H. Edward Flanders, professor of metallurgy at the University of Utah, and secretary-treasurer of the Utah Chapter A.S.M., has been awarded first prize in the Eutectic Welding Alloys Corp.'s competition for his paper on "Some Theoretical Features in Arc Welding". Papers were submitted to Eutectic on an international basis.

Prof. Flanders was born in Utah in 1894. He graduated from Utah State with a major in chemistry in 1921 and spent a year on soil survey work before returning to Iowa State College as a graduate assistant while working on his M.S. degree and his Ph.D. degree in physical chemistry, which he received in 1928. His first job was with the Armco Steel Corp. as a research worker in several branches of production, including blast furnace, openhearth, foundry, alloy development and welding. He left Armco in 1941 to become assistant director of research with American Steel Foundries, and then joined the staff of the Armour Research Foundation in 1943. In 1946 he went to the University of Utah as professor of metallurgy. He is also doing research there.

His membership in the Utah Chapter dates back to 1926, and he was partly responsible for its organization. He is a member of several other technical and honor societies.

Induction Heating Applications Explained At Minnesota Meeting

Reported by Knox A. Powell

Research Engineer
Minneapolis-Moline Co.

The October meeting of the Minnesota Chapter featured J. R. Coley, assistant sales manager, Ajax Electrothermic Corp., who gave an illustrated talk on "Induction Heating Applications".

Mr. Coley discussed the principles of operation and commented on the types of equipment available for the various induction heating and melting applications in industry. Standard line frequency of 60 cycles is suitable for low-temperature heating, such as stress-relieving of weldments, chemical vat heating and heating nonferrous bars prior to extrusion. Medium frequencies from 960 to 10,000 cycles are used for melting and forging operations, the higher frequencies ranging from 10,000 to the megacycle range for heat treating applications, and R.F. frequencies for dielectric heating applications.

Motor-generator units for frequencies from 960 to 10,000 cycles are extremely rugged and are available in sizes from 7½ to 1250 kw. For larger blocks of power, motor-generator units can be paralleled. Practically every motor-generator unit sold is still in operation. Vacuum tube oscillators are used on applications requiring the higher frequencies for thin surface heat treating.

The heat is generated in the material to be heated, and the surrounding refractories, as long as they are nonconducting, permit melting in vacuum or under special atmospheres as no loss in efficiency.

The over-all efficiency for most heating for forging and hot forming operations should approximate 60%. The efficiency of melting operations is about 50%, considering all losses. Speed of heating, accuracy, and material and labor savings permit induction heating equipment to compete favorably with other types of heating and melting equipment.

Bach Defines Heat Treating Problems

A. Dudley Bach (Center), President of the New England Metallurgical Corp., Spoke on "Commercial Heat Treating Problems" Before the October Meeting of the Hartford Chapter. Shown with Mr. Bach are Harold Sprague, (left), New Departure Division, General Motors Corp., chairman, and John Swift, (right) president, Swift Industrial Chemical Co., technical chairman

Reported by Harold M. Brodsky

Fatnir Bearing Co.

A. Dudley Bach, president of the New England Metallurgical Corp., gave an extremely interesting talk on "Commercial Heat Treating Problems" before the October meeting of the Hartford Chapter. Over 200 members from the more than 30 manufacturing plants that are sustaining members of the Chapter attended this meeting.

Mr. Bach stressed the fact that many of the difficulties encountered in heat treating can be traced back to the design engineer. Most designers have no conception of hardenability and distortion as it affects the heat treater. He compared the relative merits of induction hardening and flame hardening from the commercial heat treater's point of view. Both methods have been used consistently to salvage parts without changing the original dimensions.

Mr. Bach showed colored slides of many heat treating operations and problem parts.

Carney Explains Gas Behavior in Liquid Iron and Steel

Reported by J. B. McNichol

Metallographic Laboratory
Algoma Steel Corp., Ltd.

"The Behavior of Gases in Liquid Iron and Steel" was explained to the members of the Northern Ontario Chapter in October by Dennis Carney, chief development metallurgist, South Works Plant, United States Steel Co.

Metals, like humans, take in gases, Dr. Carney stated. These gases are both advantageous and disadvantageous in iron and steel. Steel plants all over the world spend millions a year to get rid of gases in steel.

Oxygen, nitrogen and hydrogen were each discussed in relation to the following points: Their source and how they are dissolved in iron and steel; their effect on the properties of metals; their solubility in liquid iron and steel; their chemical reactivity; methods of sampling and analysis of these gases in iron and steel; and commercial data on these gases in liquid steel.

Gases in liquid iron and steel are responsible for such phenomena as porosity and flaking. Oxygen forms metal oxides in steel, which in turn are responsible for steel cleanliness. The solubility of gases in steel varies with the pressures involved, the temperature, acidity of the bath, and the alloying elements in the solution.

Dr. Carney stated that the latest methods for sampling steel are the chemical methods of analysis such as "wet chemical" and "vacuum fusion", and discussed each method in detail. He showed a number of slides which illustrated the various principles involved in his lecture.

IMPORTANT MEETINGS

for January

Jan. 19-22 — American Society of Mechanical Engineers. (With the Society for the Advancement of Management). Plant Maintenance Conference. Cleveland. (C. E. Davies, Secretary, A.S.M.E., 29 West 39th St., New York 18, N. Y.

Jan. 19-23 — American Institute of Electrical Engineers. Winter General Meeting. Hotel Statler, New York. (H. H. Henline, Secretary, A. I. E. E., 33 West 39th St., New York 18, N. Y.)

Jan. 26-30—American Standards Association, Inc. Gaillard Seminar on Industrial Standardization. Engineering Societies Bldg., New York. (John Gaillard, 400 West 118th St., New York 27, N. Y.)

New Films

Microcast—A Story of Industrial Progress

The Microcast Division of Austenal Laboratories, Inc., has released a 21-min. technicolor film with sound entitled "Microcast—A Story of Industrial Progress", which portrays the story of investment casting. The film is available for loan to metallurgical and engineering groups, and a speaker may be requested. For information on obtaining the film, write directly to the Microcast Division of Austenal Laboratories, Inc., 224 East 39th St., New York 16, N. Y.

Battelle Goes Abroad—

The cornerstone for a new research center at Frankfurt/Main, Germany, to serve the industry of that country, was laid on Oct. 31. The new Battelle Memorial Institute for Germany is being established by Battelle Memorial Institute of Columbus, Ohio.

Simultaneously, Director Clyde Williams, A.S.M., announced that Battelle is establishing another research center at Geneva, Switzerland, and has set up a program of fellowships for selected students in the universities of both Switzerland and Germany. In addition, research centers and fellowship programs for other countries of Western Europe are contemplated for the future.

The Frankfurt research center will engage in chemical, metallurgical, and engineering research. It is already under construction on a site presented for the purpose by the City of Frankfurt. The laboratory will cost an estimated one million dollars, and another half-million will be required to equip it. Battelle-Frankfurt has been licensed by the Bohn government to operate as a nonprofit organization. Plans call for the Frankfurt laboratories to be completed for occupancy by late spring of 1953.

Steel Founders' Society Wins National Award

The Steel Founders' Society of America, 50-year old technical organization serving the steel castings industry, has been cited for national recognition as the winner of the 1952 Award of Merit conferred by the American Trade Association Executives, international society of professional trade association executives.

The Award was made to the Society ". . . for its excellent services to its industry and its broad program of varied services to manufacturers of steel castings."

Thill Says Permanent Bearing Possible

W. E. Thill, Assistant Chief Engineer, Federal-Mogul Corp., Spoke on "Everlasting Sleeve-Type Bearings" at the October Meeting of the Chicago Chapter. Shown above are: Otto Zmeskal, director of department of metallurgical engineering, Illinois Institute of Technology; Ed Roff, chief control metallurgist, U. S. Steel Co., chairman; Mr. Thill; and George P. Halliwell, director of research, H. Kramer and Co., technical chairman

Reported by R. E. Wahlstrom
International Harvester Co.

Under one definition of the word "e v e r l a s t i n g", some present-day sleeve-type bearings can be considered in that category, according to W. E. Thill, assistant chief engineer, Federal-Mogul Corp., who spoke at the October meeting of the Chicago Chapter. His topic was "The Prospects of Everlasting Sleeve-Type Bearings".

Mr. Thill first outlined the normal requisites of a bearing, and then added to this his thoughts concerning additional requirements to make the bearing highly satisfactory, or everlasting. His contention was that all moving parts are expendable with time and usage due to wear, even though amply lubricated. If the rate of wear of a part, through design or material changes, becomes lowered to eliminate it as a replacement problem, it can be considered everlasting.

Mr. Thill defined a bearing as the support or supports of a shaft under relative rotation and loading. A sleeve bearing, for optimum functioning, needs additional mechanical considerations, d e s c r i b e d as a round, straight housing bore of the proper size into which the correct bearing halves are assembled under clean conditions, and a straight, round shaft of the correct size and surface finish, to give a predetermined diametral oil clearance between shaft and bearing. Another requirement is good clean lubricating oil in the clearance space under pressure.

Bearing designs differ in proportions of length and diameter, in oil holes and in oil grooving. Additionally, bearings can differ in materials, such as a bronze or steel back with a variety of lining materials—lead and tin babbitts, cadmium, copper and aluminum alloys, and even silver.

The selection of a bearing material is totally dependent upon the type of operation, loading, and surrounding materials being used. The properties of the bearing materials to meet the conditions must be known by the bearing engineers. Such properties include fatigue resistance, conformability and embedability characteristics, antiscoring and seizure tendencies, bonding ability, and compressive strength.

The relation of the bearing, housing and shaft has an important effect on the "bearing qualities". The shaft assumes an eccentric position in the bearing and is supported by an oil wedge. The nature of the load, shaft speed, shaft material and hardness of the shaft must be considered in the selection of proper bearings. The load may be unidirectional or fluctuating, and the bearing may be operated at constant or variable speed.

Consideration must be given to the initial assembly and proper maintenance of the bearing to obtain maximum life in a new unit. Damage may be caused to bearings when other parts are being repaired. Among the malpractices in repairing that cause bearing failure, the following are most prevalent—dirt in engine, dirt between bearing and its seat, out-of-round bearings, misalignment of bearing cap, poor oiling, insufficient oil clearance, and excessive oil clearance.

Chapter Yearbooks

All local chapter secretaries of the American Society for Metals have on hand the yearbooks of most of the other chapters. A.S.M. members are at liberty to request the addresses of members and sustaining member companies from their chapter secretaries if the information is available.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 19	Engineers Club	F. G. Tatnall	Is Testing Necessary?
Boston	Jan. 9	Hotel Shelton	H. H. Lester	Sauveur Memorial Lecture
Buffalo	Jan. 8	Sheraton Hotel	R. F. Mehl	Tracers in Metallurgical Research
Calumet	Jan. 13	Phil Smidt	A. R. Lytle	Philosophy of Research
Chicago	Jan. 12	Museum of Science and Industry	G. F. Pellisier	Electron Microscope
Cincinnati	Jan. 8	Engineering Society	R. B. Johnson	Jet Engine Materials
Cleveland	Jan. 5	Hollenden Hotel	W. T. Bean, Jr.	Strain Measuring Equipment
Columbia Basin	Jan. 29	Richland Public Library	A. E. Folke	
Dayton	Jan. 14	Engineers Club		Liquid Salts vs. Gas Atmospheres
Detroit	Jan. 12	Rackham Bldg.	O. E. Cullen	Applications of Controlled Atmospheres
Hartford	Jan. 13	The Hedges, New Britain	M. B. Bever	Carbonitriding
Indianapolis	Jan. 19	McClearney's Restaurant	B. L. Averbach	Today's Toolsteel Metallurgy
Inland Empire	Jan.			TV Forum
Kansas City	Jan. 21	Benish Restaurant	H. B. Knowlton	Current Metal Situation
Lehigh Valley	Jan. 9	Hotel Traylor	H. J. Babcock	Squirting Commercially Useful Shapes From Cold Steel
Los Alamos	Jan. 6		B. A. Rogers	Formation of Eutectoids in Zirconium Alloys
Los Angeles	Jan. 22	Rodger Young Auditorium		Old Timers' Night
Louisville	Jan. 6	Korfhage's Tavern	R. L. Dowdell	National Officers Night
Mahoning Valley	Jan. 13	Post Room, V.F.W.	S. Marshall	Manganese Recovery From Slag
Milwaukee	Jan. 13	City Club	R. L. Wilson	High Carbon Steels in Engineering Applications
Minnesota	Jan. 15	Covered Wagon	R. L. Wilson	Developments in Alloy Constructional Steels
Montreal	Jan. 5	Queens Hotel	Jerome Strass	Hot Extrusion of Steels and Related Alloys
New Haven	Jan. 22	Hotel Elton, Waterbury	E. H. Hollingsworth	Heat Treatment of Age-Hardenable Aluminum Alloys
New Jersey	Jan. 19	Essex House Hotel	Howard Scott	Relation Between Design and Heat Treatment of Metal Parts
New York	Jan. 12	Hotel New Yorker	W. D. Tisdale, Jr.	Influence of Rare Earths on Properties of Ferrous Metals
Northern Ontario	Jan.		Harry Walthers	Electric Furnace Practices
North Texas	Jan. 8	Dallas	R. L. Wilson	Developments in Alloy Constructional Steels
Notre Dame	Jan. 14	Engineering Building	F. D. Widner	Practical Applications in Carbonitriding
Oak Ridge	Jan. 21	K. of C. Hall	H. B. Goodwin	Molybdenum Fabrication
Ontario	Jan. 9	Royal York Hotel Toronto	R. G. Friedman	Modern Hot Forging
Ottawa Valley	Jan. 6	Physical Metallurgy Research Laboratory	M. Cohen	Storage Batteries
Penn State	Jan. 6	State College	A. T. Gwathmey	Surface Properties of Large Metal Crystals
Peoria	Jan. 12	Morton, Ill.	H. Gover	Gas vs. Induction in Heat Treatment of Steel
Philadelphia	Jan. 30	Engineers Club	D. H. Ruhnke	Boron Steels
Pittsburgh	Jan. 8	Schenley Hotel	John F. Victory	Problems of High Speed Flight
Purdue	Jan. 20	Purdue Union	E. H. Dix	Discovery & Development of New Aluminum Alloys
Rochester	Jan. 12	Howard Johnson's	Weston Morrill	Magnetic Materials
Rockford	Jan. 28	Faust Hotel	W. H. Holcraft	Gas Atmospheres
St. Louis	Jan. 8	DeSoto Hotel	G. A. Roberts	Toolsteels—Selection and Heat Treatment
Saginaw Valley	Jan. 20	Frankenmuth's	R. D. Heidenreich	Practical Applications of the Electron Microscope in Metallurgy
Springfield	Jan. 19	Ivy House	J. F. Libsch	Metallurgical Aspects of Induction Surface Hardening
Syracuse	Jan. 6	Onondaga Hotel	H. P. Gray	Investment Casting
Texas	Jan. 6	Ben Milam Hotel	R. L. Wilson	Developments in Alloy Constructional Steels
Tri-City	Jan. 6	Rock Island Arsenal	H. E. Replogle	Heat Treatment of Toolsteels
Tulsa	Jan. 9		R. L. Wilson	Developments in Alloy Constructional Steels
Utah	Jan.	Newhouse Hotel	S. Hughes	Kennecott Utah Copper Refinery
Warren	Jan. 8	El Rio	A. DiGiulio	Aluminum Cladding of Steel
Washington	Jan. 12	Naylors Restaurant	J. J. B. Rutherford	Methods for Manufacturing Tubing
Western Ontario	Jan. 16	Mario's Tavern, Windsor	Bert Foote	Film—This Moving World
West Michigan	Jan. 19	Elks Club, Grand Rapids	Frank Foote	Atomic Reactors
Wichita	Jan. 20	K. of C. Hall	K. R. Wickstrom	What's New in Testing Equipment
Worcester	Jan. 14	Hickory House	H. H. Harris	Impending Revolution in Casting Processes
York	Jan. 14	West York Inn	J. Y. Riedel	Toolsteels

Bornstein Accepts UN Appointment

Hyman Bornstein, chief technical consultant of Deere & Co., Moline, Ill., has accepted a temporary appointment with the Technical Assistance Administration of the United Nations. He will act as metallurgical consultant to the Govern-

ment of Israel on foundry, heat treatment, metallurgical laboratories and related metallurgical problems. After completing the appointment, which is for a maximum of six months, Mr. Bornstein will return to Deere & Co.

Mr. Bornstein is widely known for his work in the field of high-grade cast iron, as well as in the development of high-strength, wear resistant and alloy cast irons. He has headed the committees on cast iron of the American Foundrymen's Society, of which he was once president, and the American Society for Testing Materials. He has served as a Trustee of the American Society for Metals, and in 1948 he received the A.S.M.'s Distinguished Service Award for meritorious contributions to progress in alloy steels.

OBITUARIES

HARRY D. SIEGFRIED of Philadelphia died suddenly of a heart attack on Oct. 22. Mr. Siegfried had been active in the steel industry virtually all his life. He started work at Midvale Co. as a boy. In 1924 he joined Henry Disston & Sons, Inc., where he worked until last April, when he retired. At the time of his retirement he was manager of sales in the steel division. Mr. Siegfried was active in both the A.S.M. and the American Iron and Steel Institute.

JOHN T. ROBBINS, 50, metallurgist and sales engineer for Peter A. Frasse and Co., Inc., New York, died on Oct. 18. Mr. Robbins was widely known throughout the country as a result of his 20 years of service in the metal-working industry.

J. J. SULLIVAN, metallurgist at the Springfield, (Mass.) Armory and a member of the Springfield Chapter A.S.M. died early in October.

Canton-Massillon Repeats Educational Lectures

The current program on "The Principles of Heat Treatment" being presented by the Canton-Massillon Chapter (as reported in November *Review*, p. 8) is now being given twice a week because of the unusually large registration of persons who wish to take the course. The schedule has been revised, as follows:

Oct. 27 and 29—"Introduction to Heat Treatment", by S. W. Poole.

Nov. 3 and 5—"Hardness and Hardenability", by D. Niconoff.

Nov. 10 and 12—"Physical Properties", by A. Christianson.

Nov. 17 and 19—"Transformation of Austenite", by R. L. Nichols.

Nov. 24 and 26—"Case Hardening and Grain Size", by C. Shelton.

Dec. 1 and 3—"Practical Heat Treatment", by G. B. Trumble.

Ten Years Ago

Quotes From *Metals Review* November 1942

The A.S.M. pamphlet on "N.E. Steels" (collected and edited from material published in *Metal Progress*) has gone through five printings, two revisions, and over 12,000 copies have been distributed.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

W. W. Howell, Technical Abstracter

Assisted by Joseph Enke, Claudia Belknap, Ardeth Holmes and Members of the Translation Group

A GENERAL METALLURGICAL

366-A. Tin Conservation. Morris R. Machol. *Journal of the American Society of Naval Engineers*, v. 64, Aug. 1952, p. 459-474.

Suggestions include reducing thickness of babbitt in bearings, changes in design of bearing shape and methods of bonding, substituting babbitt metals with smaller Sn content, i.e. Pb base instead of Sn base, reducing percentages of Sn in solder, and specifying bronze compositions of smaller Sn content where physical or corrosion resistant characteristics will permit. Diagrams. (A4, Sn)

367-A. The Industry in the World Today. *Light Metals*, v. 15, Sept. 1952, p. 302-303; Oct. 1952, p. 336-337.

Surveys the Al industry in India. (A4, Al)

368-A. Materials Engineering Department at Westinghouse Develops, Improves, and Applies Materials. T. C. Du Mond. *Materials & Methods*, v. 35, Apr. 1952, p. 87-90.

Basic objectives and philosophies of above group, including organization chart and description of typical jobs and facilities. (A9)

369-A. Iron and Steel. A. M. Sage, J. Pearson, and J. C. Hudson. *Reports on the Progress of Applied Chemistry*, v. 36, 1951, p. 233-263.

Review on progress in the iron and steel field in 1951. Material for special purposes, constructional and engineering steels, surface treatments, physical metallurgy and methods of examining metal, chemical analysis, fundamental process chemistry, and corrosion. Numerous references. (A general, Fe, ST)

370-A. Non-Ferrous Metals: Physical Metallurgy. D. W. Wakeman. *Reports on the Progress of Applied Chemistry*, v. 36, 1951, p. 264-277.

Review of progress in 1951. Mechanical properties, constitution, solid state reactions, thermodynamics, precipitation hardening, melting and casting, corrosion and protection, and notes on wrought metals. Numerous references. (A general, EG-a)

371-A. Wyman-Gordon Co. Leader in Aircraft Forging. Part I. North Grafton Heavy Press Plant. Part II. The Worcester Plant. John C. McComb. *Steel Processing*, v. 38, Sept. 1952, p. 435-455; Oct. 1952, p. 510-512.

Highly illustrated plant description. (A5, F22)

372-A. New Frontiers in Massachusetts. John Pfeiffer. *Steelways*, v. 8, Sept. 1952, p. 8-11.

Metallurgical laboratory at Massachusetts Institute of Technology. (A3, A9)

373-A. Making the Foundry Safe for Top Production. Stanley C. Herbine. *Foundry*, v. 80, Nov. 1952, p. 120-123, 277-279.

Foundry hazards, particularly those affecting eyes. How some companies have successfully implanted safety consciousness among workers and thereby reduced accidents. (A7, E general)

374-A. Ion Exchange. Does It Have a Role in the Mineral Industry? Nathaniel Arbiter. *Engineering and Mining Journal*, v. 153, Nov. 1952, p. 80-85.

Mechanism of process with applications to water softening, deionization, food-product treatment, pharmaceuticals, and metal recovery from wastes. The latter includes recovery of $CuSO_4$ from copper wastes; purification and recovery of Cr in plating; and metal treating and purification of H_3PO_4 used in pickling baths. (A8, L12, L17, Cu, Cr)

375-A. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery* (American), v. 59, Nov. 1952, p. 161-178.

Extensive table consisting of type of material, trade name, properties, and applications. Includes such varied types as plastics, polishing compounds, coatings, new alloys, cutting oils, rust inhibitors, lubricants, wetting agents, welding and brazing rods, and many others. (A10)

376-A. German Light Metal Fabricating Industry. *Metal Industry*, v. 81, Oct. 31, 1952, p. 347-348. (Based on article in *Metall*, Oct. 1952.)

Position of German Al industry with respect to industrial equipment, demand, exports, and competition with steel. (A4, Al)

377-A. Cooperative Research Activities: The British Iron and Steel Research Association. (Anon.) **The British Welding Research Association.** K. Winterton. *Metallurgia*, v. 46, Oct. 1952, p. 179-185.

Brief account of work at these research organizations. (A9, K general, Fe, ST)

378-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 19, Oct. 1952, p. 445-452.

Oct. issue includes terms "Dioxan" to "Elastic Limit". (To be continued.) (A10)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

379-A. Disposal of Plating Room Wastes. IV. Batch Volatilization of Hydrogen Cyanide From Aqueous Solutions of Cyanides. (Concluded.) Barnett F. Dodge and Walter Zabban. *Plating*, v. 39, Nov. 1952, p. 1235-1244.

Study of evolution of HCN from aerated and agitated solutions. Appendix describes calculation of rate-of-volatilization constant for HCN and over-all stripping coefficient for batch volatilization of HCN from acidified cyanide solutions. Addendum describes use for design purposes of the empirical correlation for stripping of cyanide by aeration. Data are charted, tabulated, and discussed. (A8, L17)

380-A. Foreign Machine Tools. Ralph M. Kovel and Tell Berna. *Steel*, v. 131, Nov. 17, 1952, p. 92-94, 104, 107.

Companion articles debate economic problem posed by imports of foreign machine tools. Kovel believes that these imports answer a present need. Berna believes that they are a threat to our security. (A4, G17)

381-A. (Book.) **Laboratory Design for Handling Radioactive Materials.** 140 pages. 1952. National Academy of Sciences, Washington, D. C. (Building Research Advisory Board, Research Conf. Rept. 3)

Laboratory layout; air supply and exhaust; control and shielding of isotopes; surfaces and finishes; and disposal of radioactive wastes. Includes data on corrosion, susceptibility to contamination, and decontamination for a variety of surfaces: glass, organic, Al, Pb, stainless and structural steel, etc. Tables, photographs, and diagrams. Bibliography. (A9, P13, R general, Al, Pb, SS, ST)

382-A. (Book.) **Physical Metallurgy for Engineers.** D. S. Clark and W. R. Varney. 116 pages. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y. $6.50.

Subjects normally handled in texts on metallurgy for engineering students. The book is considerably more complete in development of subject matter than the usual text. (From review in *Iron Age*.) (A general)

383-A. (Book.) **Resources for Freedom. Vol. I. Foundations for Growth and Security. Vol. II. The Outlook for Key Commodities. Vol. III. The Outlook for Energy Sources. Vol. IV. The Promise of Technology. Vol. V. Selected Reports to the Commission.** 184, 210, 43, 228, and 154 pages. June 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Report of President's Materials Policy Commission. First volume presents a summary and analysis of materials problem and recommendations of the Commission for its solution. In Vol. 2 and 3 studies on specific materials and energy resources are presented. Fourth volume reviews opportunities for technology to help resolve some of the

more troublesome problems; the fifth presents a few of the basic studies prepared to assist the Commission in its deliberations.
(A general)

B

RAW MATERIALS AND ORE PREPARATION

353-B. New Grinding Theory Aids Equipment Selection. Fred C. Bond. *Chemical Engineering,* v. 59, Oct. 1952, p. 169-171.

New theory which states that work necessary to break a ton of rock is inversely proportional to square root of the diameter of the product particles. Assumption is made that work input necessary to break rock is essentially that necessary to deform rock beyond its critical strain to form cracks. Equations and laboratory data. (B13)

354-B. Combustion and Fine Grinding With the Jet Mill. G. M. Croft and L. D. Bechtel. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 61-68.

Jet pulverizer can be applied in general to solid fuels for combustion purposes and to fine grinding of various other materials used in fields such as chemical, building materials, paper, food, and others. Pulverization is accomplished by collision of particles against themselves instead of against any portion of mill. Schematic diagram and photographs. (B13)

355-B. Disposal of Flotation Tailings. R. W. Unger. *South African Mining and Engineering Journal,* v. 63, Sept. 6, 1952, p. 15, 17.

Methods used by Idarado Mining Co., Colorado, to prevent pollution of streams, to reclaim and reuse mill water, and possibly retreat tailings. (B14, A8)

356-B. The Technology of Iron Ore. B. D. Thomas. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 40-44.

The role of technology and other factors in utilization of ores from various sources, in relation to various steel-producing districts. These districts are shown, together with their ore sources and potential quantities of ore. 14 ref. (B10, Fe)

357-B. The Technology of Manganese. S. L. Case and John W. Clegg. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 45-54.

Possible means for reduction of the large waste now encountered in smelting of ferromanganese. 18 ref. (B22, Fe-n)

358-B. Potential Sources of Alumina in Canada. W. K. Gummer. *Canadian Mining and Metallurgical Bulletin,* v. 45, Oct. 1952, p. 605-610; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 365-370.

Data obtained by field men and various laboratories on rocks collected from Cape Breton to British Columbia. Includes information from government reports, particularly those on clays and shales and written from point of view of clay-consuming industries. (B10, Al)

359-B. On the Removal of Copper From Pyrites Cinder and the Roasting of Pyrites. Kiyokado Nishihara and Yoshio Kondo. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 14, July 1952, p. 145-167.

Relationship between operating condition of a roaster and degree of leaching of copper from pyrites cinder was investigated, and on basis of results obtained, operating conditions of a mechanical roaster to increase degree of leaching copper from pyrites cinder were studied. Tables and graphs. (B15, Cu, Fe)

360-B. (German.) The Magnetic Beneficiation of Low-Grade Iron Ore. Heinz Hendrickx and Günter Scheibe. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 321-324.

Experiments on reduction of iron ore to magnetic ferrous-ferric oxide with pulverized coal, activated carbon, starch, and paraffin. Results reveal that reduction is accomplished by organic carbon compounds rather than by pure carbon. X-ray pictures, tables, and diagrams. 16 ref. (B14, Fe)

361-B. (German.) Evaluations of Grinding Experiments With the Aid of Grinding Functions. O. Theimer and F. Moser. *Kolloid Zeitschrift,* v. 128, Sept. 1952, p. 68-74.

Relationship of the pulverizing mechanism to the grain-size distribution and the residues of grains larger than a given size. It is shown that the arithmetical average of grain sizes indicates (with certain limitations) the efficiency of the mill for a given grain size range. Diagrams and graphs. 4 ref. (B13)

362-B. Reserve Mining Co. Starts Taconite Plant At Babbitt. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 72-79.

Layout of plant with pictorial presentation of the plant, open-pit mines, and homes for workmen. (B14, B12, A6, Fe)

363-B. Geomines. A Major Open-Pit Tin Producer in the Belgian Congo. H. Barzin. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 86-89.

Distribution of minerals, mining altered and unaltered ores, and drilling problems. Concentration flowsheet includes crushing and grinding, screening, jigging, thickening, classification, and tabling operations. (B10, B12, B13, B14, Sn)

364-B. Continuous Updraft Sintering Recovers More SO_2 for Smelter. W. R. Burrow. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 90-94.

The process and comparison with downdraft processes. Pilot-plant experiments on a 75% Pb concentrate at the Broken Hill smelter, Port Pirie, South Australia. Photographs, diagrams, and tables. (B16, Pb)

365-B. How Induced Radioactivity May Help Separate Minerals. A. M. Gaudin, F. E. Senftle, and W. L. Freyberger. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 95-99, 174, 176.

Tests conducted at the Brookhaven National Laboratory to determine how induced radioactivity varies among the more common minerals and how these differences might be applied in their separation. Data are tabulated and charted. (B14, S19)

366-B. Raw Material Outlook Good for Western Steelmaking. S. G. Sargis. *Journal of Metals,* v. 4, Aug. 1952, p. 821.

Situation with respect to coking coals, limestones, and iron ores. (B18, B22, Fe)

367-B. Hot Rolling Behavior of Resulphurized Steels Improved With Manganese Sulphide Additions. S. Feigenbaum. *Journal of Metals,* v. 4, Aug. 1952, p. 825.

Experiences of Jones & Laughlin Steel Corp., mainly with C-1117 grade, but to some extent with C-1115, C1119, and C-1120. Addition of MnS reduced surface defects in hot rolled semifinished bars. (B22, F23, CN)

368-B. Strategic Minerals Conference. *Mines Magazine,* v. 42, Oct. 1952, p. 74-78.

Includes opening remarks by S. H. Williston, plus following brief articles: "Tungsten", Charles H. Segerstrom, Jr.; "Antimony", James P. Bradley; "Chromite", F. W. Libbey; "Mercury", Gordon I. Gould; and "The Development of Domestic Sources of Manganese", P. R. Bradley, Jr. (B10, A4)

369-B. Treatment of Complex Lead-Zinc Ores in the West. *Mines Magazine,* v. 42, Oct. 1952, p. 85-87.

Economic and technological problems. (B14, A4, Pb, Zn)

370-B. Microstructures in Iron Ore Pellets. Strathmore R. B. Cooke and Thomas E. Ban. *Mining Engineering,* v. 4, Nov. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 1053-1058.

Mineralogy, structure, and strength of magnetite pellets fired in air and in a neutral atmosphere at various temperatures. Information is used to explain origin of structures occurring in pellets produced by pilot-plant operation. Graphs, micrographs, and tables. (B16, M27, Fe)

371-B. Concentration of Bastnaesite and Other Cerium Ores. J. B. Zadra, A. L. Engel, E. S. Shedd. **With Analytical Methods.** A. C. Rice. *U. S. Bureau of Mines,* Report of Investigations 4919, Oct. 1952, 15 pages.

Tests made on above ores. Tabulated data. (B14, S11, Ce)

372-B. (German.) The Mineral Resources of Turkey and Their Utilization of the Home and Foreign Iron and Steel Industry. Horst Weigelt. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1353-1364.

Development of Turkish mining industry including Government Mining Research Institute and its functions, and the significance of the most important mineral deposits. Iron and steel production at Karabük works. (B10, A9, Fe, ST)

373-B. (Book.) Mining Year Book, 1952. 572 pages. Walter E. Skinner, Financial Times, 20 Copthall Ave., London, England. 31s. 6d.

World-wide record of companies interested in the mining industry—officers, property description, and economics. List of mining and consulting engineers, mine managers, and agents. Buyers guide. (B12)

C

NONFERROUS EXTRACTION AND REFINING

152-C. Non-Ferrous Metals: Extraction and Refining. G. L. Evans. *Reports on the Progress of Applied Chemistry,* v. 36, 1951, p. 278-291.

Review of progress in 1951. Extraction, refining, mineral dressing and, briefly, economics. Numerous references.
(C general, B general, A4, EG-a)

153-C. Malleable Chromium and Its Alloys. H. L. Gilbert, H. A. Johansen, and R. G. Nelson. *U. S. Bureau of Mines,* Report of Investigation 4905, Sept. 1952, 22 pages.

Improvements in production of high-purity Cr metal by Mg reduction of anhydrous chlorides and by hydrogen treatment of electrolytic chromium. Hydrogen-treated Cr was arc-melted, and the arc-melted material has been successfully forged,

rolled, and swaged. Results of X-ray and metallographic studies. Heat resistance of Cr. Graphs, tables, diagrams, photographs, and micrographs. (C26, C23, F22, F23, M27, Cr)

154-C. (French.) **The Role of Silicon and Iron in the Reduction of Zinciferous Charges.** Eugène Frenay. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 567-572.

Influence of molecular composition on reducibility. Effects of Si and Fe content. Data are tabulated and charted. (C21, Zn)

155-C. (German.) **Fundamental Principles of the Chlorine-Nitrogen Refining Process.** Wilhelm Dautzenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Aug. 1952, p. 308-310.

Practical considerations in applying the process in Al refining. (C4, Al)

156-C. The Technology of Titanium. Robert I. Jaffee and John M. Blocher, Jr. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 65-81.

Extractive processes, reduction of process costs, means of improving performance, use as a substitute metal and future prospects. 26 ref. (C general, T general, Ti)

157-C. Electrolytic Zinc Plant at Monsanto, Illinois. T. I. Moore and L. A. Painter. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1149-1159.

Advances during the past 11 years at this plant include leaching, clarification and residue treatment, purification, Cd recovery; operations in the electrolysis department, cell room, power-conversion equipment, cathode melting, the casting operation, furnace oxide recovery, and furnace dross handling. Tables, photographs, and diagrams. (C23, Zn, Cd)

158-C. Separation of Lead, Cadmium, and Germanium Sulfides From Zinc Sulfide Concentrates. H. Kenworthy and J. S. Absalom. *U. S. Bureau of Mines,* Report of Investigations 4876, May 1952, 7 pages.

Methods and conditions under which metallic sulfides with boiling points lower than sphalerite may be removed from ZnS concentrates by volatilization. Results show that, under proper conditions, it is possible to remove over 90% of the Pb, Cd, and Ge as an enriched sublimate. Diagram. (C28, Pb, Cd, Ge, Zn)

159-C. (German.) **Research on the Nature of Earing in Continuously Cast Pure Aluminum.** H. Hug, G. Siebel, and P. Buser. *Metall,* v. 6, Oct. 1952, p. 579-586.

Experiments made to study the effect of casting and processing conditions. Photographs, diagrams, and graphs. (C5, Al)

160-C. (German.) **The Formation of the Cuprous Oxide-Rich Surface of Horizontally Cast Copper Wire Bars Cooled in Air.** Paul Klare. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Sept. 1952, p. 350-353; disc., 353-354.

Experiments made to explain the reason for the high Cu_2O content of the surfaces of Cu bars cast by different methods. Photographs, diagrams, tables, and graphs. (C5, Cu)

161-C. The Separation of the Anhydrous Chlorides of Iron and Aluminium by Formation of Graphite Complexes. R. C. Croft. *Journal of Applied Chemistry,* v. 2, Oct. 1952, p. 557-562.

Possibility of separation of $FeCl_3$ and $AlCl_3$ by heating the mixtures with graphite was investigated. Stabilities of the complexes formed were studied. It was concluded that separation is feasible and of possible value in industrial chlorination of ferruginous Al ores. (C28, Al)

162-C. The Reaction Between Ferric Oxide and Anhydrous Aluminium Chloride. R. C. Croft. *Journal of Applied Chemistry,* v. 2, Oct. 1952, p. 562-565.

Theoretical and experimental investigations. Possible application to removal of Fe from ferruginous bauxite. (C28, Al)

163-C. Reverberatory Campaigns Increased—Hot Patching Practice at McGill Smelter. Edward Pesout. *Journal of Metals,* v. 4, Aug. 1952, p. 815-818.

Practice prior to 1939 was to operate reverberatory furnace until a hot spot or a thin section developed in the furnace arch. The furnace would then be shut down and arch and corresponding sidewall replaced. With increased copper demand, and reduction of available labor because of selective-service requirements, hot-patching method was initiated to instrument a more continuous operation. Hot-patch compositions, and methods and equipment for application. Diagrams. (C21, Cu)

164-C. Observations on the Preparation of Iodide Titanium. O. J. C. Runnalls and L. M. Pidgeon. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 843-847.

Kinetics of iodide process. Deposition rate is geometry-sensitive in a system containing a finely divided Ti charge. Results indicate that iodine diffusion rate influences velocity of the process. Nonvolatile iodide, TiI_3, forms in hot filament zone, thus removing iodine from the cycle. Diagrams, graphs, and illustrations. 10 ref. (C4, Ti)

165-C. Decarburization of High Carbon Cobalt Metal. John H. Dismant, J. Hugh Hamilton, W. Martin Fassell, and John R. Lewis. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 884.

Use of two methods for preparation of low-C metallic Co from precipitated Co oxides. Carbon reduction of the oxides took place in a 3-phase electric-arc furnace. In one method CO_2 was bubbled through molten Co. In the other, molten Co was maintained in a CO_2 atmosphere. Data tabulated. (C21, Co)

166-C. Two Laboratory Furnaces for Melting Titanium Alloys. J. A. Rees. *Metallurgia,* v. 46, Oct. 1952, p. 186-190.

Construction of furnaces (vacuum vertical graphite-resistor type and arc type). Schematic diagrams and photographs. (C21, Ti)

167-C. Continuous Casting of Non-Ferrous Metal. Part II. Experimental Casting Techniques Employed for Various Metals. B. H. C. Waters. *Metal Treatment and Drop Forging,* v. 19, Oct. 1952, p. 433-438.

Causes of various phenomena associated with continuous casting of metals. Effects of casting rate, mold surface and shape, and solidification rate. Techniques used to continuously cast Pb, Zn, Al, Cu, cast iron, steel, and Bi-Sn eutectic alloy. (To be continued.) (C5, D9)

168-C. Cobalt Refining at Nkana, Northern Rhodesia. *Mining Journal,* v. 239, Oct. 24, 1952, p. 455-456. (Reprinted from *Rhokana Review,* v. 1, Nos. 11-12)

Varying stages of cobalt purification at Nkana. Processes used at the company's new plant. (C21, Co)

169-C. The Lubumbashi Smelter at Elisabethville, Belgian Congo. *Mining Journal,* v. 239, Oct. 31, 1952, p. 486-487. (Reprinted from *Chemical Engineering and Mining Review* (Australia).

Sintering; slag disposal; blister casting; and gas, dust and fume recovery at above Cu smelter. Flow diagram. (C21, Cu)

170-C. The Extraction and Possible Uses of Rhenium. Graham Oldham. *Mining Journal,* v. 239, Oct. 31, 1952, p. 488-489.

History, extraction, and possible uses. (C general, T general, Re)

D

FERROUS REDUCTION AND REFINING

378-D. Metallurgy of the Bessemer Process. H. B. Emerick. *Blast Furnace and Steel Plant,* v. 40, Oct. 1952, p. 1177-1183, 1206, 1212-1213, 1218.

Early development, properties, description of converter, working the blow, blowing problems, thermal effects, etc. 21 ref. (D3, ST)

379-D. Development of Active Mixer Practice at Appleby-Frodingham. A. Jackson. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 184-202.

Experiments on treatment of Fe between the blast-furnaces and mixer. Refining of Fe before mixing; Mixer practice—performance of four ordinary mixers and one steel furnace mixer. Cross-section diagrams and tables. (D1, ST)

380-D. Renaissance in Steelmaking Methods. H. G. Batcheller. *Steel,* v. 131, Oct. 27, 1952, p. 94, 96, 98.

Rising capital investment per ton of steel produced, higher labor costs, and dwindling raw materials supplies spur search for entirely new techniques in reduction and refining. (D general, ST)

381-D. Shift on Number 9. A. W. Martinez. *Steelways,* v. 8, Sept. 1952, p. 20-23.

Steelmaking in an openhearth furnace. (D2, ST)

382-D. The Technology of Iron and Steel. Clarence E. Sims. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 31-40.

In the face of adverse conditions, what can technology do to maintain an abundant supply of steel at low cost and of high quality? Attempts to answer this question from standpoint of iron and steelmaking. Improved blast furnaces, coke supply and quality, direct-reduction process, improved steelmaking processes, and other potential savings through technology. (D general, Fe, ST)

383-D. (French.) **Spectrographic Control of the Bessemer Process.** R. Breckpot, B. Juchniewicz, and C. de Clippeleir. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 552-560.

Photographically from the ultraviolet at 2100 A to the infrared at 9000 A, using either a quartz or a glass prism. Isochromatic and isochronal diagrams. 10 ref. (D3, S11, ST)

384-D. (French.) **Results Obtained at Denain With the "Cowper" Stove of Blast Furnace No. 3.** Daniel Petit. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 623-632; disc., p. 632.

Cowper stoves of variable turbulence were tested in 1947. Tests done in 1950 are compared to these earlier results. Data are tabulated. Diagrams illustrate construction of the stoves. (D1, Fe)

385-D. (French.) **Hydrodynamic Study on Small-Scale Models, and on Full-Sized Models, of the Bath Movements**

of Iron Converters. P. Leroy. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 673-688; Oct. 1952, p. 747-761.

Blowing conditions in converters were examined in order to create maximum conditions for avoiding spattering and loss of metal. Experimental conditions and results. Practical application of the results. Diagrams, tables, and graphs. 15 ref. (D3, ST)

386-D. (German.) **Progress in the Basic Lining of Openhearth Furnaces.** Luis Hütter. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1285-1293; disc., p. 1293-1298.

Results of life tests made during recent years. Improvements in lining technique and new materials. (D2, ST)

387-D. Open Hearth Zebra Roof Experience Analyzed. T. H. Harley. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1146.

Results of a survey to determine success of this type of roof. 63 openhearth shops were contacted. Tables. (D2, ST)

388-D. Some Information Regarding the Effects of High Alumina Contents of Blast Furnace Slags. H. Schrader. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 25-60; disc., p. 60-63.

Effect on viscosity of slags, disadvantages of high Al_2O_3 content, ways of minimizing it, effect of Al_2O_3 and MgO additions on desulfurizing power, and means for overcoming deterioration during desulfurization. Graphs and tables. 21 ref. (D1, Fe)

389-D. Rapid Determination of the Basicity of Open Hearth Slags by Examination in Reflected Light. S. Visvanathan and R. Muthuswamy. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 65-80; disc., p. 80.

Review of various methods. Genesis of microstructure of openhearth slags as revealed by petrographic examination. A method of appraising slag basicity by following changes in microstructure of a slag during a heat, by examination of slag samples in reflected light. Tables, graphs, and micrographs. 20 ref. (D2, M21, ST)

390-D. (French.) **International Research on the Low-Shaft Blast Furnace.** *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, Oct. 1952, p. 393-398.

A historical review, and work now under way for development of this furnace. Schematic drawings. (D1, Fe)

391-D. (German.) **Experiments in the Small Basic Converter on the Production of Low-Nitrogen Steels.** Karl Georg Speith and Helmut Bücken. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 325-333.

Compares results obtained from normal and small converters. Experiments reveal advantages of melting with oxygen-enriched blast in small converters. Desirable effect of ore addition is explained by cooling effect and by the resulting supply of nitrogen-free oxygen. Good effects were obtained with O_2-CO_2 blasts. Graphs and tables. 14 ref. (D3, ST)

392-D. Melt Carbon and Related Open Hearth Problems. Parts III-IV. W. J. Frisbie, Jr. *Blast Furnace and Steel Plant,* v. 40, Oct. 1952, p. 1190-1196; Nov. 1952, p. 1325-1330.

Use of more hot metal for reducing the amount of scrap charged. Furnace-life problem, use of cold Fe in openhearths, limestone charge, ore charge, and differences in furnace practice occasioned by variations in charging time. Part IV discusses the periods from hot metal to finish flush and from finish flush to melt. (D2, ST)

393-D. Silicon Limits Oxygen Utilization in Iron for Carbon and Silicon Removal. W. R. Lysobey. *Journal of Metals,* v. 4, Aug. 1952, p. 819-820.

Experiments indicate that oxygen lance was not practical for removing Si, Mn, or C from blast-furnace iron. Only 30% of the O_2 injected actually reacted with the elements in the bath. On the other hand, when O_2 was introduced into high-alloy-steel melts, about 60% of it reacted. It appears that, in the Fe-Si-C system, degree of O_2 utilization is inversely proportional to Si concentration. (D1, Fe, SS)

394-D. (French.) **International Research on the Low-Shaft Blast Furnace.** *Revue de Métallurgie,* v. 49, Oct. 1952, p. 741-746.

Purpose of the research and the first installation near Liege. Technical characteristics of the pilot-plant and the furnace itself. (D1)

395-D. (German.) **Investigations on the Most Favorable Design of Hot Blast Stoves.** Walter Keller. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1328-1336.

Temperature distribution, characteristic data for different types of checkerwork, increase in waste-gas temperature, and the difference between this temperature and that of the entering cold air due to dependency on different checkerwork loads. Schematic diagrams of stove-hood designs, and details of heat-recovery experiments. (D1, Fe)

396-D. (Italian.) **The Electric Furnace in the Cast Iron Foundry: Comparison of the Mechanical Properties of Pig Iron From an Electric Arc Furnace and From a Cupola.** M. Barbero and D. Fortino. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 308-318.

A review on the basis of the literature. Specialized purposes of each type of furnace. Data are tabulated and charted. 26 ref. (D5, E10, Q general, CI)

397-D. (Italian.) **Reduction Equilibria of the CaO-Fe_2O_3 System.** Aurelio Burdese. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 343-346.

Reduction diagrams of sintered solids in the above system are plotted at various temperatures. Results of progressive reduction are tabulated. (D general, Fe)

398-D. (Italian.) **Reduction of Monocalcium Ferrite at Various Temperatures.** Vittorio Cirilli and Aurelio Burdese. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 371-375.

Experimental details of the above. Reduction equilibria with CO_2 and with H_2. Data are tabulated and charted. (D general, Fe)

399-D. (Italian.) **The Use of Machine Casting in Foundries. I. The Behavior of Ingot Molds Made From Pig Iron Cast in Sand or by Machine. II. The Manufacture of Centrifugal Tubes From Pig Iron Cast in Sand or by Machine.** *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 432-447.

Experiments conducted by the "Instituto Siderurgico Finsider", using 244 experimental ingot molds, and on an experiment with centrifugal tubes on an industrial scale. Data are interpreted and tabulated. (D9, F26, CI)

E
FOUNDRY

629-E. Effect of Oxidation Rates on Graphitization of Cupola-Melted Malleable. Milton Tilley. *American Foundryman,* v. 22, Oct. 1952, p. 46-47.

An investigation of cupola metal, as it is melted, before being mixed and further refined in the holding furnace by pouring samples at the cupola spout. Photomicrographs. (E25, CI)

630-E. How the One-to-Ten Ram Test Measures Sand and Mold Properties. Clyde A. Sanders and Arthur G. Clem. *American Foundryman,* v. 22, Oct. 1952, p. 48-50.

Describes method. Typical results charted. (E18)

631-E. Cupola Deoxidation Improves Iron Casting Machinability. F. S. Kleeman. *American Foundryman,* v. 22, Oct. 1952, p. 61-66.

Process which involves use of a briquetted deoxidizer to increase machinability. This makes it possible to increase machining production with present facilities. Photomicrographs show comparative structures. Machining test data are tabulated and charted. (E10, G17, CI)

632-E. (French.) **The Behavior of Cores During Casting.** Pierre Nicolas. *Fonderie,* Aug. 1952, p. 3043-3059.

Respect to soaking, untamping, and gases freed by the cores during casting. Schematic drawings, graphs, and photographs. (E21)

633-E. (French.) **Normal Technical Possibilities of Pressure Casting.** R. Grunberg. *Métallurgie et la Construction Mécanique,* v. 84, July 1952, p. 499, 501, 503; Aug. 1952, p. 561, 563.

Metal properties and forms which must be present if pressure casting is to be applied on the basis of available data. Tables contain French and foreign specifications for Zn, Al, and Mg alloys. Graphs. (E13, Al, Zn, Mg)

634-E. (French.) **Impregnation of Unquenched Castings.** Henry Garnier. *Revue de l'Aluminium,* v. 29, Sept. 1952, p. 323-326.

In light-alloy castings that are otherwise satisfactory, porosity can be eliminated by using fillers. Pressure or vacuum is used to increase penetration of sodium silicate, drying oils, synthetic resins, or varnishes. Schematic diagram of equipment. (E25, Al, Mg)

635-E. (German.) **Notes on the Evolution of Carbon Monoxide Upon Passage of Carbon Dioxide Over Incandescent Coke.** G. Clas and E. Djernaes. *Giesserei,* v. 39, Sept. 18, 1952, p. 473-477.

Combustion processes in the cupola furnace and significance of the Boudouard equilibrium in cupola operation. Test procedure and results. Graphs and diagrams. 12 ref. (E10, CI)

636-E. (German.) **Behavior of Different Chill Materials During Production of Steel Castings.** E. Lanzendörfer. *Giesserei,* v. 39, Sept. 18, 1952, p. 483-486.

The following materials were investigated: ordinary bessemer steel; bessemer steel containing 0.29% Al; ordinary desiliconized openhearth steel; and openhearth steel containing 0.26% Si. Macrographs and micrographs illustrate structures of the castings obtained. (E23, E25, CI)

637-E. (German.) **Purification of Aluminum Melts With Chlorine Gas in the Foundry.** W. Büchen. *Giesserei,* v. 39, Sept. 18, 1952, p. 491-498.

Impurities likely to be present, physicochemical processes occurring during chlorine treatment, equipment, melting furnaces, heat balances, safety precautions, and testing. (E25, Al)

638-E. (Russian.) **The Cooling of Castings.** A. I. Veinik. *Doklady Akademii Nauk SSSR.* new ser., v. 85, July 21, 1951, p. 559-562.

The mechanics and thermodynamics of the cooling of castings, particularly in metallic molds. (E25, P12)

639-E. (Swedish.) **Nomenclature for Gating Systems.** *Gjuteriet,* v. 42, Sept. 1952, p. 139-144.

A tentative Swedish nomenclature for gating systems for steel, iron and nonferrous metals. The terms suggested are described in 22 figures, and put together in a table with translations into French, German, and English. (E22)

640-E. Balanced Blast Cupola Boosts Iron-Coke Ratio, Offers Other Advantages. Norman Bennett. *Canadian Metals,* v. 15, Oct. 1952, p. 56, 58.

Special arrangement of tuyeres which improves efficiency of combustion in melting gray iron. (E10, CI)

641-E. Centrifugally Cast Stainless Steel Rings. C. V. Hotson. *Canadian Metals,* v. 15, Oct. 1952, p. 62-64.

Canadian process which results in less expensive and quicker operation, and castings of greater density and higher quality with fewer inclusions. (E14, SS)

642-E. Strain Theory of Hot Tearing. William S. Pellini. *Foundry,* v. 80, Nov. 1952, p. 124-133, 192, 194, 196, 199.

Investigations at the Naval Research Laboratory demonstrated that hot tearing actually represents fracture through liquid films which exist at near-solidus temperatures. Diagrams, photographs, micrographs, and graphs show results for various ferrous and nonferrous metals and alloys. (E25, Q26)

643-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, Nov. 1952, p. 236, 238.

Seventh of series. Types of cupola fluxes, their function in obtaining clean metal, and how to judge efficiency of slag during melting. (E10, CI)

644-E. Titanium Casting Research Tests Shell Molded Refractories. J. G. Kura. *Iron Age,* v. 170, Oct. 30, 1952, p. 88-92.

Experiments in which various materials were tested for construction of satisfactory shell molds for Ti. Results and contamination measurements. Tables, diagrams, photographs, and micrographs. (E19, Ti)

645-E. (French.) **Elimination of Aluminum Present in Bronze.** Georges Blanc and Pierre-Julien le Thomas. *Fonderie,* Sept. 1952, p. 3091-3106.

A comprehensive report. Experimental results are tabulated and charted. (E25, Cu)

646-E. (German.) **Bentonite as a Molding-Sand Binder.** Otto Eckart. *Giesserei,* v. 39, Oct. 2, 1952, p. 529-533.

Properties of bentonite, the reasons for the binding strength of this mineral in green and dry sand molds. Tables, diagrams, and graphs. 12 ref. (E18)

647-E. (German.) **Electrical Heating of Gates for Heavy Steel Castings.** W. Rietzscher. *Giesserei,* v. 39, Oct. 16, 1952, p. 553-558.

Amount of piping, rate of solidification, required gate sizes, and necessary electrical energy. Ways of combating the undesirable effects of segregation. Data are graphed. (E22, CI)

648-E. The Influence of the Sulphur-Manganese Ratio on the Occurrence of Mottle in Whiteheart Malleble Iron. S. W. Palmer. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Oct. 1952, p. 394-402.

Experimental data and results. Tables, graphs, and macrographs. (E25, M27, CI)

649-E. A Study of Some Metallurgical Factors Influencing Chill and Mottle Formation in Cast Iron. W. J. Williams. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Oct. 1952, p. 403-423.

Effect of superheating, inoculation, melting stock, and the possible effect of oxygen, on the chilling properties of low-Si cast irons. Results are correlated with existing information and theories on the effects of superheating and inoculation on chill formation. Tables and macrographs. (E25, CI)

650-E. Light Alloys' Modern Foundry. *Canadian Metals,* v. 15, Oct. 1952, p. 52-54.

Plant layout of Dominion Magnesium, Ltd., foundry at Haley, Ontario, where turbine engines for jet aircraft are manufactured. (E11, Mg)

651-E. Permanent Ceramic Moulds for Non-Ferrous Casting. D. E. Hope. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 503-504.

Process developed for producing small nonferrous castings repetitively with a finish similar to die castings, but at a lower cost than that which embodies preparation of a metal die. (E19, EG-a)

652-E. Internal Stress in Castings. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 505-509.

Discussion of report of Subcommittee T.S.32, (Oct. 23 issue.) Light alloys, pouring temperatures, cooling methods, and effects of mold materials. Examples of conditions of internal stress in particular castings, and additional work on high-temperature effects. A theory to explain delayed cracking. (E25, Q25)

653-E. Sand-Cast Beryllium-Bronze. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 511-514.

Further discussion of paper by L. Grand. (Sept. 18 issue.) Includes additional photomicrographs. See item 620-E, 1952. (E11, Q general, Cu, Be)

654-E. The British Cast Iron Research Association. J. G. Pearce. *Metallurgia,* v. 46, Oct. 1952, p. 193-194.

Various aspects of work done at this organization. Gases in cast iron, properties of molding sands, working conditions in foundries, and analysis of cast iron by means of the direct-reading spectrograph. (E general, A9, CI)

655-E. Beryllium Copper Molds. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 23, Nov. 1951, 5 pages.

Comments taken from various references on the above. 12 ref. (E19, Cu)

656-E. The Casting Of Metals in Permanent Molds. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 3, July 1950, 13 pages.

48 references. (E12)

657-E. Impregnation of Metal Castings. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 24, Nov. 1951, 5 pages.

In order to secure pressure tightness, the use of a sealant is sometimes justified. Some of the procedures used. 22 ref. (E25)

F

PRIMARY MECHANICAL WORKING

310-F. Model Forging Experiments; The Use of Plasticine. F. Mortimer. *Iron & Steel,* v. 25, Oct. 1952, p. 433-436.

Use of colored wax to study the processes of forging and stamping. Plasticine resembles metals in its stress-strain curve and in its constancy of volume under plastic flow. Diagrams and illustrations. (F22, ST)

311-F. Small Two-High Reversing Mills for the Rolling of Semi-Finished Products. Edwart T. Peterson, Lewis W. King, and Edward C. Peterson. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 69-77.

Trend toward increased use of small and very large mills. Large units are used for C and low-alloy steels, and wide stainless slabs, while increased use of the smaller mills is explained by a corresponding increase in size of ingots of high alloy, stainless, and toolsteels referred to as "specialty steels". (F23, AY, TS, SS)

312-F. Avoiding Trouble in Soaking Pit Operation. D. J. McGeary. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 92-94; disc., p. 94-96.

Retarded production as a result of "nothing hot"; delays and quality deterioration due to lack of more complete heating and soaking. (F21, ST)

313-F. A New Hot Mill for Strips Up to 24 in. Wide. M. Langen. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 203-214.

Arrangement, design, and performance. (F23, ST, EG-a)

314-F. Electric Drives for Continuous Hot Mills. G. R. Wilson. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 215-225.

Reasons for some of the selections made. Drives using one motor per mill and one motor per stand. Typical curves show relative motor performance with different forms of control system. Converting plant for supplying d.c. motors. Comparisons between motor-genertor sets and mercury-arc rectifiers. (F23, ST, EG-a)

315-F. Aluminium Sheathed Cables. *Metal Industry,* v. 81, Oct. 3, 1952, p. 265-267, 271.

Manufacture and use for replacement of lead cable sheaths. Use of pre-extruded tube; swaging and sinking operations. Photographs and diagrams. (F26, T1, Al)

316-F. Dodge Forge Introduces a "First" in the Forging Industry. John C. McComb. *Steel Processing,* v. 38, Oct. 1952, p. 497-502, 517-518, 523.

An automatic production line installed for the press forging of automotive crankshafts in which the billet stock, after being sheared, is heated and preformed without being touched until it arrives at the forging press. Photographs and diagrams. (F22, CN)

317-F. ACSR Wire. Frank E. Weise, Jr. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1023-1026, 1130-1131.

Control practiced in production of galvanized steel wire. Tables and diagrams. (F28, L16, CN, Zn)

318-F. The Control of Wire Drawing Solutions for Copper. Robert C. Williams. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1032-1033.

Recommended practices for proper makeup of solution, means of meas-

uring its strength, control of temperatures, and pH range. (F1, Cu)

319-F. (French.) **Progress Made in the Manufacture of Refinery Furnace Tubes.** Jean Dauvergne. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 1-12; disc., p. 43-49.

Special French techniques. Standardization. Hydrogen absorption and removal. Determination of hydrogen in liquid steel. Stress and torsion studies at elevated temperatures. Extrusion and creep studies. Welding. Photographs, and micrographs.
(F26, Q general, T29, SS, AY)

320-F. (German.) **Lubricant Carriers for Drawing Steel Wire of Low and High Carbon Contents.** Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1207-1212.

The various types and requirements to be met. Production, composition, properties, and applications of lime; properties, applications, and advantages of borax over lime; development of other alkaline carrier materials; and use of graphite for special applications. 31 ref.
(F1, F28, ST)

321-F. (German.) **Boundary-Friction Lubricants.** Martin Kühn. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1212-1216.

The theoretical fundamentals of lubrication are deduced from practical experiments and chemical characteristics of the lubricants. Relationships between lubricant and carrier in wire drawing. Theories of chemical composition and physical behavior of lubricants. (F1, F28)

322-F. (German.) **Predetermination of Power, Work, and Output Required for Cold Upsetting.** Joseph Billigmann. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1221-1230.

General formulas for power and work required, standard values for deforming strength and resistance, effect of shape of bolt head in cold upsetting, factors to represent effect of material, simplified formulas to predetermine upsetting pressure, work, and output. Diagrams and tables. (F22, ST)

323-F. (German.) **Straightening Rolled Products.** Erich Siebel. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1298-1301.

Stresses and deformations in elastic bending a d when stressed above the elastic limit. Straightening of various products and by various methods. Illustrations and charts.
(F29)

324-F. (German.) **The Metallography of Light Metals. III. Formation of Structure in Wire Drawing.** H. Kostron. *Metall,* v. 6, Oct. 1952, p. 590-597.

Extruded, drawn, and hardened Al-Cu-Mg wire was investigated for the effect of the various operations on grain size, grain-size distribution, and strength of wire. Photomicrographs, tables, and graphs. 14 ref. (F28, M27, Q23, Al)

325-F. Forged Skin-Panels. Part 3. Progressive Forging of Panels; Suck-In Effect; Investigation and Analysis of Test-Panels. *Aircraft Production,* v. 14, Nov. 1952, p. 373-376.

Describes tests and tabulates data. 75S, 14S, and Dow FS alloys were investigated. (F22, Al, Mg)

326-F. Progress Made in Heavy Forge-Press Art. Irving Stone. *Aviation Week,* v. 57, Nov. 17, 1952, p. 50-52, 54, 56, 59-60.

General discussion with illustrations. Emphasis on work with 18,000-ton press being operated by Wyman-Gordon Co. for U. S. Air Force, on Al and Mg airframe components. (F22, Al, Mg)

327-F. Rolls and Rolling. Part XXXII. Rails. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 40, Nov. 1952, p. 1311-1318.

Pass-design standardization. Roll designs. (F23)

328-F. New Automatic Unit Makes Drop Forgings in Mid Air. *Iron Age,* v. 170, Nov. 13, 1952, p. 155-157.

Problems, applications, and future use of method which consists of holding a blank in mid-air and having two horizontal die-holders strike it simultaneously from opposite directions. (F22)

329-F. Sheathing Cable With Aluminium. *Metallurgia,* v. 46, Oct. 1952, p. 175-178.

Johnson and Phillips process, which consists of threading the cable core through an aluminium tube, followed by swaging and sinking. (F25, Al)

330-F. Swaged Housing Ring Grooves to Retain Axial Thrust Bearing. C. H. Avery and A. G. Brisack. *Product Engineering,* v. 23, Nov. 1952, p. 149-152.

Design criteria for retaining bearings in housing by means of a lip roll swaged around circumference of housing bore. Results of an investigation that included press swaging, friction spin swaging, and roll swaging of both ductile and notch sensitive materials. Tests were conducted on 24SO, 75SO, and 75ST Al; and on FS-lh Mg. Micrographs and diagrams. (F25, T7, Al, Mg, SG-c)

331-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 965-970, 978.

Rotating regulator-amplifiers, and their application for tension reel control, inertia effects in variable speed drives and effects of I.R. drop and I.R. drop compensation.
(F23, S18)

332-F. New Squeeze on Steel. Richard Cheney. *Steelways,* v. 8, Nov. 1952, p. 20-23.

Adaptation of French hot-extrusion process to American industry. Photographs and diagrams.
(F24, ST)

333-F. (Book) **Cold Working of Non-Ferrous Metals and Alloys.** 207 pages. 1952. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England.

Includes five papers comprising a symposium on metallurgical aspects of following subjects: fundamental aspects of cold working of nonferrous metals; cold rolling of nonferrous metals in sheet and strip form; wiredrawing technique and equipment; deep drawing and pressing of nonferrous metals and alloys.
(F23, F28, G4, EG-a)

G

SECONDARY MECHANICAL WORKING

494-G. The Shear Angle Relationship in Metal Cutting. M. C. Shaw, N. H. Cook, and I. Finnie. *American Society of Mechanical Engineers,* Paper 52-SA-51, Apr. 28, 1952, 20 pages.

Several analytical solutions for shear angle in metal cutting. Underlying assumptions are critically discussed. Diagrams. 17 ref. (G17)

495-G. Metal Removal by Oxygen Processes. E. H. Holub. *Blast Furnace and Steel Plant,* v. 40, Oct. 1952, p. 1197-1199.

Cutting, lancing, gouging, scarfing, deseaming or desurfacing, processes for removing defective surface metal, and flame washing or flame finishing, a manual process for removal of metal from surfaces in varying amounts with a high degree of control. The powder process is being used increasingly on stainless steels, cast iron, and some nonferrous material. Equipment and procedures. (G22, ST, CI)

496-G. Soviet Machine Tools. (Concluded.) J. Mannin. *Engineers' Digest,* v. 13, Sept. 1952, p. 309-310, 316.

Review of recent advances and current developments in the Russian machine tool industry. (G17)

497-G. The Plastic Forming of Metals. *Fortune,* v. 66, Nov. 1952, p. 138-141, 218, 222, 224.

Three processes (forming by drawing, cold extrusion, and hot extrusion) used to form various metals to closely finished shapes, thus saving machining, materials, and man hours. (G4, G5)

498-G. How Water Soluble Oils Affect Carbide Milling Cutter Life. J. R. Roubik. *Iron Age,* v. 170, Oct. 23, 1952, p. 112-115.

Carbide face milling tool-life tests on four medium-carbon steels at Brinell hardnesses of 200, 300, and 400 which show that use of H_2O-soluble oil emulsions as a cutting fluid has no value in prolonging tool life. Steels used in tests were SAE 3140, 4340, 4145, and 4145 sulfurized.
(G21, C-n, AY)

499-G. How Structure Influences the Machinability of Thin Gray Iron Castings. Edward A. Loria. *Materials & Methods,* v. 35, Feb. 1952, p. 99-100.

Practical test results show that inoculating iron with silicon carbide improves surface machinability of thin sections. Graphs. (G17, CI)

500-G. Eyelet Machine Products Versus Screw Machine Products. Walter E. Allan. *Product Engineering,* v. 23, Nov. 1952, p. 181-183.

Merits of both methods for forming small parts from Armco iron, brass, SAF 1010 steel, stainless steel, Zn, Cu, bronze, Ni, and Al. Diagrams.
(G4, Fe, CN, SS, Zn, Cu, Ni, Al)

501-G. On the Problem of Lubricity in the Machining and Working of Metals. E. Kadmer. *Third World Petroleum Congress. Proceedings,* sec. VII, 1951, p. 343-353; disc., p. 353-354.

Object was to adduce examples of metal machining and metal working processes which show that it is both possible and necessary to test suitability of lubricants for these applications, and to provide numerical data concerning these lubricants. Includes chemical surface treatments. (G21, F1, L14)

502-G. Effect of Certain Impurities on Free Cutting Brass. Grayson B. Wood, Jr. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1027-1029, 1128-1130.

Results of tests to determine effect of impurities of Fe, Al, and to lesser extent, Pb, Sn, and Sb, on operations of machining, drawing, and annealing. (G17, G4, J23, Cu)

503-G. (German.) **Free Bending of Sheet-Metal.** K. H. Wolter. VDI Forschungsheft 435, Supplement to *Forschung auf dem Gebiete des Ingenieurwesens,* ser. B, v. 18, no. 3, 1952, 32 pages.

Earlier research and theories on bending are refined to obtain proper relations between bending forces, bending lines, and plate curvatures in the case of free bending. Results show that free bending is superior to conventional bending by means of dies. Numerous graphs and diagrams. 35 ref. (G6)

504-G. (German.) **Boron Carbide as Lapping Abrasive in Precision Finishing.** W. Uhlmann. *Metall,* v. 6, Sept. 1952, p. 530-534.

Application to the finishing of various machine parts. Diagrams and micrographs. (G19, C-n)

505-G. (German.) **Deformation of Clips and Rim Zones of Workpieces During Turning.** Walter Leyensetter. *Stahl*

und Eisen, v. 72, Sept. 11, 1952, p. 1139-1144; disc., p. 1149.

Method of measuring the deformation and results of its determination on two plain carbon and one low-alloy steel, in dependence on cutting rate. Deformation of the rim zones of longitudinal and transverse polished sections after machining at cutting rates of 30-140 meters per min. Graphs and micrographs. (G17, CN, AY)

506-G. (German.) **The Machinability of Plain Carbon Steels in Fine Turning.** Gustav Wagner. *Stahl und Eisen*, v. 72, Sept. 11, 1952, p. 1144-1149.

Tests using the "tool life—tool path" method using high speed steel tools on rimmed and killed free-machining steels, case hardening, structural, and toolsteels having carbon contents of 0.02-0.76%. A relative characteristic value for machinability of plain carbon and alloy steels is deduced. Data are compared with those for American steels and with those obtained using conventional cutting speeds. (G17, CN)

507-G. (German.) **Deep Drawing of Large Sheet-Metal Parts.** Heinrich L. Hilbert. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Sept. 1, 1952, p. 817-823.

Experiences in the field of automobile body-parts production. Tools, materials, and costs; reasons for defects. Diagrams and photographs. (G4, CN)

508-G. (German.) **Establishing of the Surface Quality in Turning From the Weight of Shavings.** W. Leyensetter. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Sept. 1, 1952, p. 825-828.

Experimental details on a new method. Data are tabulated and charted. (G17)

509-G. How to Machine Stainless Steel With Carbides. Jos. J. Robert. *American Machinist*, v. 96, Oct. 27, 1952, p. 109-112.

Recommendations for the various types of stainless steels. Data on tool angles, carbide grades, speeds, and feeds are drawn from successful applications to a broad range of jobs. (G17, SS)

510-G. What Constituents Affect Machinability of Gray Irons? E. A. Loria, F. W. Boulger, and H. L. Shaw. *American Machinist*, v. 96, Oct. 27, 1952, p. 122-124.

Effect of composition, multiple correlation analysis, and effect of combined carbon. Graphs and tables. (G17, CI)

511-G. Drawing and Welding Two-Piece Fenders. Herbert Chase. *Automotive Industries*, v. 107, Nov. 1, 1952, p. 68-71.

Process in use by Ford Co. Spot and arc welding techniques are used. (G4, K1, K3, CN)

512-G. New Lubricant Improves Die Life, and Finish. W. E. Curtiss. *Iron Age*, v. 170, Oct. 30, 1952, p. 94-95.

In drawing a 6.5-in. deep, 3-in. diam. shell from 0.065 annealed blanks of 1010 steel considerable difficulty was encountered in fourth and final draw. Hard Cr plated dies had extremely short life and pick-up on dies caused scuffing and scratches on shells. Use of Metalloid X-60 as a die lubricant increased number of pieces per dressing from 1000 to 11,800 with same dies. Improved surface finish and increased output were achieved with no changes in setup, feeds, speeds, and lubrication methods. (G21, CN)

513-G. Special Steel Piercing Methods Appraised. A. Williman and W. P. Wallace. *Iron Age*, v. 170, Oct. 30, 1952, p. 96-98.

Bullet and jet charges were used to pierce high-Mn steel oil well casings and low-carbon SAE-1020 steel plates. Measurement of residual stress was made by X-ray diffraction techniques. Diagrams and micrographs. (G2, Q25, AY, CN)

514-G. Bearing Races Machined at High Speed. Roger Brooks. *Iron Age*, v. 170, Nov. 6, 1952, p. 180-182.

High-velocity machining of alloy steels such as SAE 52100 and 4620. Cutting speed was raised from 200-275 to cover 600 surface ft. per min. on an automatic lathe. Greater horsepower was required, tools were increased to the largest practical cross section, carbide cutting tool bits were used and chip breakers were redesigned. (G17, AY, C-n)

515-G. The Machining of High Temperature Alloys. *Aero Digest*, v. 65, Nov. 1952, p. 92-100.

Problems involved. Table gives nominal physical and machining properties of three forms of Ti, two stainless steels, and four high-temperature alloys. (G17, Q general, Ti, SS, SG-h)

516-G. How to Grind Titanium. Leo P. Tarasov. *American Machinist*, v. 96, Nov. 1952, p. 135-146.

Grinding fluids, wheel specifications, rates of cut, titanium variables, surface finish, and abrasive recommendations. Tables, graphs, and photographs. (G18, Ti)

517-G. Investment Castings Need Not Be "Free-Machining" Stainless. *American Machinist*, v. 96, Nov. 1952, p. 147-150.

Machinability tests conducted under controlled conditions showed that differences in machinability of the various grades of stainless are of far less importance than castability. Tables and graphs. (G17, E15, SS)

518-G. Electrolytic Grinding. L. H. Metzger and George Keeleric. *American Machinist*, v. 96, Nov. 10, 1952, p. 154-158.

What it is, how it is done, how wheels are made, and how to convert carbide-tool grinders to electrolytic grinders. The process is based on anodic dissolution of the work on the same principle as electropickling and electropolishing. (G18, L13)

519-G. Britain, Too, Has Electro-Spark Machining. M. G. Seed. *American Machinist*, v. 96, Nov. 1952, p. 159-160. (G17)

520-G. New Developments in Cutting Metal. R. J. S. Pigott. *American Soicety of Mechanical Engineers*, Paper 52-SA-55, 1952, 11 pages.

Factors affecting tool life. (G17, TS, C-n)

521-G. The Effect of Shot Peening on the Fatigue Life of Steel. A. G. H. Coombs. *Engineering*, v. 174, Oct. 24, 1952, p. 545-546; Oct. 31, 1952, p. 580-581.

Experimental procedures and results of investigation of a spring steel containing 0.77% C, 0.12% Si, 0.67% Mn, 0.045% S, 0.037% P, 0.28% Ni, and 0.22% Cn. Diagrams, graphs, and macrographs. (G23, Q7, CN)

522-G. Diamond Prepared Copper Wheels, Their Manufacture and Application. W. Peter. *Industrial Diamond Review*, new ser., v. 12, Oct. 1952, p. 220-224.

Abrasive wheels with diamond particles rolled into the copper surface. Graphs, diagrams, and photomicrographs. (G18, T5, Cu)

523-G. Electronics Applied to Machining Hard Metals. *Journal of Metals*, v. 4, Aug. 1952, p. 822-824.

Equipment and process used by Sparcatron, Ltd., England, which embodies the Rudorff and other patents. Advantages. Diagram and illustrations. (G17, SG-m)

524-G. (Book) **Aluminum Forming.** 151 pages. Reynolds Metals Co., 2500 S. 3rd St., Louisville, Ky.

Metallurgical and technical data pertaining to sheet and plate, types of sheet-forming operations, data on tubing and pipe, and forming, bending, and swaging of tubing and pipe. (G general, Al)

H

POWDER METALLURGY

127-H. (German.) **Production of Iron-Zinc Alloys From Amalgams.** Franz Lihl and Adolf Demel. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 307-310.

Critically discusses earlier suggestions for producing Fe-Zn alloys. Production of these alloys by powder metallurgical means in which powdered amalgams are used. Tabulated data and X-ray diagrams. 14 ref. (H general, Fe, Zn)

128-H. (Pamphlet) **Research on Surface Properties of Fine Particles.** J. M. Dallavalle, Clyde Orr, Jr., and H. G. Blocker. Georgia Institute of Technology, State Engineering Experiment Station, Atlanta, Quarterly Report No. 3, Project 131-119, Jan. 30, 1952, 30 pages.

In relation to surface area measurements, a number of experimental results relative to the continuous-flow method are presented. Rate of adsorption method is described and a few experimental results given. Among the powders used are Fe, Ni, and Cu. Graphs. (H11, Fe, Ni, Cu)

129-H. Special Report: Powder Metallurgy in Sweden. *Product Engineering*, v. 23, Nov. 1952, p. 200.

Swedish progress in using iron and steel powders for equipment parts. (H general, Fe, ST)

J

HEAT TREATMENT

267-J. Versatile Pit Furnace. Carburizes, Hardens, and Draws—'Round-the-Clock. A. H. Koch. *Metal Treating*, v. 3, Sept.-Oct. 1952, p. 2-3.

Furnace in which SAE 1020, 1045, and 1335 steels, among others, are treated. Diagram and photographs. (J26, J28, F21, CN, AY)

268-J. (English.) **High Frequency Heating and Temperature Distribution in Surface Hardening of Steel.** L. A. Dreyfus. *Acta Polytechnica*, (Electrical Engineering Series), v. 4, no. 5, 1952, 115 pages.

General survey of surface hardening methods and problems is followed by mathematical analyses (graphically interpreted) of eddy currents in ferromagnetic conductors having a red-hot nonmagnetic outer zone enveloping a magnetic core at lower temperature; surface heating of pieces of "great specific thickness" (heat flow in 1 dimension); and surface heating of pieces of "small specific thickness". (J2, ST)

269-J. (German.) **Chemical and Physical Bases of Malleablizing in a Gas Stream.** K. Roesch. *Giesserei*, v. 39, Sept. 18, 1952, p. 487-491.

Comprehensive analysis, including both theory and experiment. Compares technology and economics of use of gas and use of ore. Tables, graphs, and illustrations. (J23, CI)

270-J. (German.) **Increasing the Resistance to Wear of Cylinders in Combustion Motors.** H. Wiegand and G. Schäffeler. *Metalloberfläche,* sec. A, v. 6, Sept. 1952, p. 129-133.

Various processes for increasing the hardness of cylinder surfaces, such as heat treatment for producing high surface hardness, and methods for deposition of hard metal coatings. Relative advantages of the various methods. Micrographs. (J general, L24, SG-m)

271-J. (German.) **Heat Treatment of Aluminum and Its Alloys.** A. von Zeerleder. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, July 1952, p. 209-219; Aug. 1952, p. 255-264.

The furnaces required; also temperature measurement and control equipment. Effects of various heat producers and media for transmission of heat. Photographs and micrographs. (J general, Al)

272-J. (German.) **Investigations on Heat Treatment of Hot Working Toolsteels Within the Intermediate Transformation Temperature Range.** Walter Eilender, Robert Mintrop, and Willy Lutz. *Stahl und Eisen,* v. 72, Sept. 11, 1952, p. 1149-1156; disc., p. 1156-1157.

Results of microscopic, hardness, and magnetic examinations on behavior during transformation in the intermediate range of five alloy steels containing 0.24-0.46% C, 0.13-0.6% Si, 0.3-1.3% Mn, 1.3-2.6% Cr, 0-0.5% Mo, 0.2-1.7% Ni, 0.1-0.8% V, and 0-8.4% W. (J26, N8, TS)

273-J. (German.) **Comparison of the Technological Properties of Drawn Steel Wire as Related to Patenting in Lead and Salt Baths and Patenting in Air.** Clemens Eisenhuth and Hanns Krautmacher. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1217-1221.

Relative technology and economics of the various processes and media for patenting of steel wire. (J25, ST)

274-J. Heat Transfer in Liquid Bath Furnaces. M. H. Mawhinney. *Industrial Heating,* v. 19, Oct. 1952, p. 1788-1790, 1792, 1794, 1796, 1798, 1800, 1872, 1874-1876.

Results obtained in actual furnaces utilizing a liquid heating medium for metal coating, removal of oxides, and for heat treating of metals in the form of wire. They are presented as an aid in estimating capacity and performance to be expected from other furnaces. Graphs and tables. (J general, L16)

275-J. Cost Analysis in Industrial Heating. B. W. Depew. *Industrial Heating,* v. 19, Oct. 1952, p. 1802, 1804, 1806, 1808, 1810, 1812, 1814.

Cost breakdown analysis in phases of annealing malleable iron castings, furnace brazing, heat treatment, hot-dip galvanizing, and heating for forging. (J general, K8, L16, F21, CI)

276-J. (German.) **Carburizing, Nitriding, and Siliconizing Surface Layers of Iron Containing Tungsten and Molybdenum.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 377-382.

Experiments prove that above treatments greatly improve hardness and surface condition of molybdenized and tungstenized parts of iron or steel. Optimum conditions for this treatment were investigated. Tables, graphs, and photomicrographs. 10 ref. (J28, L15, ST, Fe)

277-J. Short Cycle Annealing for Malleable Iron. C. E. Rehder. *Canadian Metals,* v. 15, Oct. 1952, p. 70, 72.

Developments at Bowmanville, Ont., where a short-cycle, flexible annealing process offers economic advantages. (J23, CI)

278-J. Titanium Can Be Case Hardened by Nitriding. Edmond J. Silk. *Iron Age,* v. 170, Nov. 13, 1952, p. 166-170.

Investigation carried out by Sam Tour & Co., to surface harden Ti. Graphs, tables, and micrographs. (J28, Ti)

279-J. (Italian.) **Isothermal Annealing of Hypereutectoid Steels.** Mario Baj. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 319-329.

Advantages, such as shorter processing time and higher degree of softening, and comparison with those of other methods. Difficulties of large-scale application. Tables and micrographs, 10 ref. (J23, ST)

K

JOINING

772-K. Submerged Arc Welding at Atlas Steels, Ltd. Carl Edwall. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 55-60.

Correlates characteristics of the process with its advantages. Cost data for several repair jobs on cast steel and forged steel equipment. (K1, CI, CN)

773-K. Welding of Metals Important to the Petroleum Industry. H. G. Geerlings and C. Vollers. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 15-31; disc., p. 43-49.

After a definition of the concept, weldability of various metals is evaluated. Test for determining this property for thin sheet metal. Factors which limit welding of Cr-Mo steels. Use of austenitic electrodes, determination of dilution of weld metal with base metal, and structural changes at high temperatures. Problems connected with welding of nonferrous metals, with special attention to hard facing. Mechanical properties, TTT-diagrams for a Cr-Mo steel, and constitution diagram for transition zone in stainless steel. (K9, N8, Q general, L24)

774-K. Industrial Brazing; Resistance Brazing. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Oct. 1952, p. 370-376.

Various methods and materials used in the process. Photographs and tables. (K8, Cu)

775-K. Technical Aspects of Soldering Practices. Robert M. MacIntosh. *Welding Journal,* v. 31, Oct. 1952, p. 881-897.

Various processes and materials involved are presented in a logical classification and discussed separately. Fundamental properties of solder alloys and methods of applying them efficiently at modern production speeds. Tables, photographs, and diagrams. (K7, SG-f)

776-K. New Rules for Welding Low-Alloy Ferritic Pipe Material. Charles F. Perry. *Welding Journal,* v. 31, Oct. 1952, p. 898-902.

Historical background of new rules for high-pressure, high-temperature marine piping and their principal provisions. Graphs, diagrams, and tables. (K1, S22, AY)

777-K. High-Strength Vacuum Brazing of Clad Steels. R. C. Bertossa. *Welding Journal,* v. 31, Oct. 1952, p. 441s-447s.

Development of high-strength brazed joints having a uniform and continuous bonding over large areas without use of fluxes or special furnace atmospheres. Continuous brazed bonds were produced between low and medium-carbon steels and the major types of stainless steel. (K8, CN, SS)

778-K. Weld Cracking of Aluminum Alloys. J. D. Dowd. *Welding Journal,* v. 31, Oct. 1952, p. 448s-456s.

Simple test developed for quantitative evaluation of crack sensitivity of welds in Al alloys. Results are given for several heat treatable and nonheat treatable Al alloys. Tables and graphs. (K9, Al)

779-K. Basic Flame Studies and Their Relationship to Welding Equipment. James A. Browning and Merle L. Thorpe. *Welding Journal,* v. 31, Oct. 1952, p. 465s-468s.

Study of factors affecting stability of propane flames and relationship of these factors to welding and heating equipment. Diagrams and graphs. (K2)

780-K. Spot Welding of Titanium Alloy Sheet. M. L. Begeman, E. H. Block, Jr., and Frank W. McBee, Jr. *Welding Journal,* v. 31, Oct. 1952, p. 469s-474s.

Specific welding equipment, correct machine settings, and adequate preparation of surface conditions for spot welding of Ti alloys. Diagrams, graphs, and photomicrographs. (K3, Ti)

781-K. (German.) **Welding Tests on Steel Showing an Increased Yield Point Due to Submicroscopic Inclusions.** Karl August Krekeler. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1278-1280; disc., p. 1280-1285.

Compares properties of welded specimens of St 50 with low-alloy structural steels and St 53. Includes fatigue-test data in tables and charts. 24 ref. (K general, Q23, Q7, CN)

782-K. (Russian.) **Cementing Metals Using Carbinol Glues and the Inhibiting Action of Some of Them on the Initiation of Polymerization.** A. Ia. Korolev, I. V. Stepanova and S. B. Isakova. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 331-333.

It was found that Pb and Cu alloys strongly inhibit the setting of carbinol glues, while steel, Zn, Cr, and other metals have no effect. Data are tabulated. (K12)

783-K. Automatic Welding Spurs Auto Frame Production. H. G. Schultz. *Iron Age,* v. 170, Oct. 30, 1952, p. 84-87.

System in which all operations, including welding, clamping, feeding welding wire and flux, tracing, and slag removal are fully automatic. Photographs and diagrams. (K1, CN)

784-K. Ductile Welding of Zirconium. F. G. Cox. *Murex Limited Review,* v. 1, no. 11, 1952, p. 245-261.

Equipment, mechanical and corrosion properties, and microstructure of the welds. Photographs, micrographs, tables, and graphs. (K1, Zr)

785-K. Brazing of Stainless Plating as an Aid in the Brazing of Stainless Steel. A. Korbelak and E. C. Okress. *Plating,* v. 39, Nov. 1952, p. 1220-1222, 1228.

Use of Ni electrodeposits to facilitate manufacture of large-sized intricate designs of stainless steel. A tabular summary illustrated with photomicrographs outlines use of varying thicknesses of plated coatings for different brazing temperatures. (K8, L17, SS)

786-K. Finishes for Soft Soldering. E. E. Halls. *Product Finishing,* v. 5, Oct. 1952, p. 68-79.

Finishes for metals to be soldered include hot dip coatings of Sn or solder; electroplated coatings of Cd, Sn, Ag, Pb, Sn-Pb alloy and Sn-Zn alloy; fused electroplated coatings of Sn or Pb-Sn alloy; or a combination of electroplated and hot-dip solder. Tables and diagrams. (K7, L16, L17)

787-K. These Fillet Welds Were 106 Ft. Long. Ralph H. Kipp. *Welding Engineer,* v. 37, Nov. 1952, p. 28-30.

Welding of an I-beam 53 in. deep and 106 ft. long at Judson-Pacific-Murphy Corp., Oakland, Calif. Gamma-ray inspection used. (K1, S13, CN)

788-K. How We Cured Porosity in Squirt Welding. Don W. Whiteside. *Welding Engineer*, v. 37, Nov. 1952, p. 38-39, 52.

Analysis of causes directly or indirectly responsible for porosity, which included impure flux, arc voltage too high, and arc blow. Recommended solutions. (K1)

789-K. Welding Costs Cut to ⅓. Merrill F. Yale. *Welding Engineer*, v. 37, Nov. 1952, p. 40-41.

Welding steps in fabrication of mild steel cylindrical tanks for outdoor high-voltage circuit breakers. Semi-automatic submerged-arc welding was used. (K1, CN)

790-K. It's Metal Cloth—and It's Welded. W. C. Henzlik. *Welding Engineer*, v. 37, Nov. 1952, p. 42-43.

Uses for metal cloth in strainers of high and low brass bronze, monel, stainless steel, Inconel, Nichrome, Chromel and new alloys. Equipment used for spot and seam welding and the search for a satisfactory wheel alloy. (K3, Cu, Ni, Cr, SS)

791-K. If It Goes "Pop," It's Okay. Howard E. Jackson. *Welding Engineer*, v. 37, Nov. 1952, p. 48-50, 52.

Construction of parts in a freezer, emphasizing pressure-tight welding and brazing. CO_2 gas was used for testing. Use of Cu tubing and stainless steel dashers in fabrication. (K general, T29, Cu, SS, CN)

792-K. (French.) **Influence of Torch and Arc Welding on the Properties of Aluminum and Its Alloys.** E. Zurbrugg. *Aluminium Suisse*, v. 2, Sept. 1952. p. 156-163.

Speed of welding, flux removal, atmosphere, effect of heat on Al alloys, and hardness and corrosion resistance of alloys after welding. Charts and photographs. (K1, K2, Q29, R general, Al)

793-K. Pressure Chamber Withstands 17,600 Psi. *Iron Age*, v. 170, Nov. 13, 1952, p. 158-159.

Construction of pressure chamber from SAE-4130 alloy. Care taken in welding parts together to avoid flaws. Stress relief and inspection. (K1, J1, AY)

794-K. Designing With Plug Welds. Omer Blodgett. *Machine Design*, v. 24, Nov. 1952, p. 152-153.

Advantages. Diagrams. (K general)

795-K. Metal Arc Welding of Stainless Steel. Part I. Jigging to Weld. E. M. Rains. *Sheet Metal Worker*, v. 44, Nov. 1952, p. 44-45.

Recommended procedures. (K1, SS)

796-K. Welding of Stainless Steels. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada). Report 11, Oct. 1950, 5 pages.

Alloy identification, welding methods, and metallurgical aspects. 18 ref. (K general, SS)

797-K. Considerations in Decreasing Electrode Pick-Up in the Spot Welding of Aluminum Sheet. W. P. Campbell and G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 15, Oct. 1950, 6 pages.

Pre-weld cleaning of Al sheet, electrode material, and electrode maintenance. (K3, L12, Al)

798-K. Welding of Zinc Alloy Die Castings. G. G. M. Carr-Harris. *Technical Information Service, National Research Council*, (Canada), Report 16, Nov. 1950, 8 pages. (K general, Zn)

799-K. Welding of Molybdenum. W. H. Kearns, H. B. Goodwin, D. C. Martin, and C. B. Voldrich. *U. S. Atomic Energy Commission*, BMI-703, Sept. 1, 1951, 36 pages.

Material, welding procedures, and test methods used. Results of tests made with high-purity Mo produced by vacuum fusion, and on commercial Mo. (K general, Mo)

800-K. Distortion Control in Structural Fabrication. Gordon Cape and Llewellyn Jehu. *Welding Journal*, v. 31, Nov. 1952, p. 1009-1016.

Practical methods employed to control distortion of welded products in a large Canadian steel fabricating plant. Reviews some of the fundamental aspects associated with welding, difficulties which have arisen, and methods employed in control of welded work. (K general, T26, CN)

801-K. Joint Design for Brazing. W. J. Van Natten. *Welding Journal*, v. 31, Nov. 1952, p. 1023-1028.

Selection of ferrous and nonferrous base metals; filler metals; types of joints; service requirements with regard to mechanical strength, electrical conductivity, pressure tightness, and elevated and subzero service temperatures. Extensive diagrams. (K8)

802-K. Increased Multispot Production With Limited Power Supply. C. R. Whitney, Jr. *Welding Journal*, v. 31, Nov. 1952. p. 1029-1034.

Development and design of a new multispot control which provides increased welding production despite limited power supply, by reducing transients and by sequence firing of transformers in small groups. Photographs and diagrams. (K3)

803-K. Forming and Welding of Titanium. Francis H. Stevenson. *Welding Journal*, v. 31, Nov. 1952, p. 1035-1041.

Strength tests of and tabulated information on spot welding and inert-gas tungsten-arc butt welding. Photographs and tables. (K1, K3, G general, Q23, Ti)

804-K. Strength Joints to Steel With Aluminum Bronze Filler Metals. Willis G. Groth and Robert E. Maersch. *Welding Journal*, v. 31, Nov. 1952, p. 1043-1048.

Brazing and welding concepts, tensile and hardness tests on mild steel, brazed joint test specimens, fusion-zone and test requirements, effects of heat treatment, welding procedure, and supplementary data using other steels and test specimens. Photographs, diagrams, micrographs, and tables. (K8, Q general, CN, ST)

805-K. A New Welded Railway Bridge in Switzerland. M. Frei. *Welding Journal*, v. 31, Nov. 1952, p. 1052-1054. (Translated and condensed from *lOssature Metallique*, v. 17, May 1952, p. 249-255.

Diagrams and illustrates construction. Two types of Al-killed, basic bessemer, low-carbon steel were used. (K1, T25, CN)

806-K. Back to Work Because of Braze Welding. R. L. Fuller. *Welding Journal*, v. 31, Nov. 1952, p. 1057-1058.

Photographic treatment of restoration of broken and obsolete machinery by braze welding with an oxyacetylene welding blowpipe. (K8)

807-K. Tow Carts Fabricated by Inert-Gas Metal-Arc Welding. *Welding Journal*, v. 31, Nov. 1952, p. 1059.

Construction of stainless steel carts by use of automatic butt seams, and a light-weight Heliarc torch. (K1, SS)

808-K. (German.) **Electric Resistance Flash Welding of Railway Rails.** Reinhold Kühnel. *Stahl und Eisen*, v. 72, Oct. 23, 1952, p. 1346-1349.

Effects of chemical composition and differences in dimensions of rails on welded joint quality. Specifications for preparation and selection of rail ends to be welded, plus difficulties encountered in control of welding process. Explains making of welds and treatment of joints after welding. (K3, CN)

809-K. (Book.) **Das Elektrische Widerstandsschweissen.** (Electric Resistance Welding). Walter Brunst. 290 pages. 1952. Springer-Verlag, Berlin, Germany.

Principles, procedure, and welding equipment, and recent research. Illustrations, graphs, and tables. 123 ref. (K3)

L

CLEANING, COATING AND FINISHING

941-L. Modern Metal Lithography. Ralph H. Graham. *Graphic Arts Monthly and the Printing Industry*, v. 24, Oct. 1952, p. 134, 136, 138, 140.

Various steps in the production of finished decorated metal. (L26)

942-L. Pretreatment Primers for Metal Work. E. E. Halls. *Industrial Chemist and Chemical Manufacturer*, v. 28, Oct. 1952, p. 441-445.

Compares results obtained with pretreatment primers and those given by other processes used to insure adhesion of paint and enamel finishes on ferrous and nonferrous metal surfaces. (L14)

943-L. Developments in Tests of Coatings for Steel Pipe. Graydon E. Burnett and Charles B. Masin. *Journal, American Water Works Association*, v. 44, Oct. 1952, p. 893-911.

Use of nonmetallic coatings to prevent corrosion of steel pipe, and tests to determine their efficiency. Tables and photographs. (L26, R11, CN)

944-L. Chemical and Anodic Treatments. *Light Metals*, v. 15, Oct. 1952, p. 333-335.

Tabular data on German patents. (L14, L19, Al, Mg)

945-L. An Electronic Finishing Process. John Starr. *Products Finishing*, v. 17, Oct. 1952, p. 42, 44, 46, 48, 50, 52, 54.

Purpose of the process is to ionize sprayed coating particles in a high-voltage electric field so that particles are attracted to conveyer-grounded product surfaces. Diagrams and photographs. (L23, L26)

946-L. Electrochemical and Electrometallurgical Industries. H. R. Leech. *Reports on the Progress of Applied Chemistry*, v. 36, 1951, p. 292-316.

Review of progress in 1951. Electroplating, electrolytic polishing, electrolytic production, current rectification, primary cells, and electrometallurgy. Numerous references. (L13, L17, D8, C23)

947-L. (French.) **Formation of Alloys in Thin Layers by Evaporation in Vacuum of the Pure Constituents.** Pierre Michel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 235, Aug. 4, 1952, p. 377-379.

Formation of Ag-Sn and Au-Cu alloys on a collodion support by simultaneous evaporation in vacuum. (L25, Ag, Cu, Sn)

948-L. (French.) **The Water Content of Electrolytic Polishing Solutions.** I. Epelboin. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, July-Aug. 1952, p. C137-C140; disc., p. C141.

Importance of the problem and possible solutions. 17 ref. (L13)

949-L. (French.) **Importance of the Preparation of the Surface: Graining.** (Continued.) Roger Marpon. *Métallurgie et la Construction Mécanique*, v.

84, July 1952, p. 523, 525; Aug. 1952, p. 573, 575-577.

Application of graining prior to painting. Continuity of the film, study of a system for protection of grained sheet metal, and preparation of samples. Data for five paint systems are tabulated. Second installment: Results obtained upon aging through 8, 17, 56, 62, and 79 cycles. (L26, ST)

950-L. (French.) **Protective Coating of Metals Having a High Melting Point.** R. Kieffer and Nachtigall. *Métaux: Corrosion—Industries,* v. 27, July-Aug. 1952, p. 312-317.

Emphasis on siliconizing of Mo, W, Ta, and Cb by reaction of a gas on the surface of the metal, and by oxidation of the appropriate alloy. Data are tabulated. 34 ref. (L15, Mo, W, Ta, Cb, SG-h)

951-L. Suggestions on Methods of Testing Enamels. (In German.) A. Dietzel and W. Stegmaier. *Berichte der Deutschen Kermaischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 29, Feb. 1952, p. 56-58; Mar. 1952, p. 88-92; Apr. 1952, p. 132-137; May 1952, p. 178-183.

Summarizes the most important methods of testing enamels, metals to be enameled, and enameled products; proposes new test methods. Data are tabulated. Numerous references. (To be continued.) (L27)

952-L. (German.) **Defective Sheets as Cause of Enamel Defects.** W. Heimsoeth and F. R. Meyer. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 29, July 1952, p. 234-241.

A series of investgiations shows hydrogen discharge, supersaturation of the base enamel with Fe compounds, and disturbing gas eruptions to be the main causes for these defects. Micrographs. (L27, CN)

953-L. (German.) **Surface Abrasion During Chemical and Electrolytic Polishing of Aluminum.** H. Fischer and L. Koch. *Metall,* v. 6, Sept. 1952, p. 491-496.

Mechanism for various processes. Types of baths, abrasion, corrosion-current density and gas discharge are shown in tabular form. Electron micrographs illustrate the progress of polishing. (L12, L13, Al)

954-L. (German.) **Surface Structure and Surface Hardness of Mechanically and Electrolytically Polished Copper.** K. H. Leise. *Metall,* v. 6, Sept. 1952, p. 496-497.

Compares results on the basis of electronic investigations of single crystals. Electron micrographs and diagrams. (L10, L12, Cu)

955-L. (German.) **The Significance of "Secondary" Inhibition for Electrolytic Deposition of Nickel.** J. Elze. *Metall,* v. 6, Sept. 1952, p. 500-504.

A review on the basis of the literature. The theory of inhibition, as formulated by H. Fisher; the influence of inhibition deposition temperature, and cathodic current density upon the structure of electrolytic Cu and Ni deposits. The mechanism of secondary inhibition. Micrographs. 13 ref. (L17, Ni)

956-L. (German.) **Hard-Chromium Plating of Aluminum.** E. Meyer-Rässler. *Metall,* v. 6, Sept. 1952, p. 504-509.

A review on the basis of the literature. The properties of Al and hard Cr, preliminary preparation of the Al surface, and the Cr plating operation. Micrographs. 15 ref. (L17, Cr, Al)

957-L. (German.) **Remarkable Zinc-Plating Cell.** Heinz Bablik. *Metall,* v. 6, Sept. 1952, p. 513-515.

Different types of Swedish Zn-plating cells which eliminate the many disadvantages of the iron cell.

They utilize electricity for heating purposes, and also differ in design from those used in Germany. (L17, Zn)

958-L. (German.) **Calculation of Characteristic Data for Modern Continuous Pickling Plants.** Walter Fackert. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1196-1207.

Descaling processes from the standpoint of modern rolling methods, present status of pickling processes, nature of the scale and its processes, nature of the scale and its solubility, mode of operation of modern continuous pickling plants, and interpretation of equilibria between amounts of acid, ferrous sulfate, and water in the fresh and spent solutions. Includes typical calculations and cost analysis. (L12, ST)

959-L. (German.) **Progress in Infra-Red Technology, Applications and Results.** Karl A. Lohausen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Aug. 21, 1952, p. 792-796.

Use of infrared radiators and ovens for the drying of lacquer on metals, glass, wood, and leather; and for the drying of paper, textiles, ceramic materials, and materials in grain or powder form. Application of "Vouten" radiators for heating of rooms. 12 ref. (L26)

960-L. Vacuum Metallizing as a Design Tool. J. Gordon Seiter. *Electrical Manufacturing,* v. 50, Nov. 1952, p. 148-149, 334, 336.

Technique which can be used to contribute desirable properties to component parts, reduce production costs, and speed up production rates. It is now largely used for coating of plastics. (L23)

961-L. The Influence of Sound and Ultrasound on Electro-Chemical Processes. Albert Roll. *Engineers' Digest,* v. 13, Aug. 1952, p. 257-260, 244; Sept. 1952, p. 314, 315, 316; Oct. 1952, p. 357-360. (Translated and condensed from *Metalloberfläche,* v. 4, 1952, p. B49-B53, B65-B70, B81-B89.)

Previously abstracted from original. See item 653-L, 1952. (L17, C23, Ni, Cu, Cr)

962-L. Hard Aluminum Finishes Resist Wear and Abrasion. R. V. Vanden Berg. *Iron Age,* v. 170, Oct. 30, 1952, p. 81-83.

Harder, thicker, and denser anodic surface coatings which have better resistance to wear and abrasion, are now available for Al. The combination may replace heavier metals for such things as gears, slides, pinions, pistons, and many aircraft applications. Other materials such as Cr, Sn, brass, and Pb have also been coated onto Al to give outstanding characteristics. (L19, Q9, T7, Al)

963-L. Speedy Plating of Small Diameter Steel Tubing. *Iron Age,* v. 170, Nov. 6, 1952, p. 174-175.

Unusual plating setup which applies Cu to small-diameter tubing in a continuous operation at Rochester Products Div. of General Motors Corp. At speeds of 40-150 ft. per min. on tube diameters of ⅝-⅞ in., Cu coatings of 0.0004 in. are applied in a single pass. Another unusual setup is used in plating short lengths of automobile radio-antenna tubes. Formerly, heavy coatings of Cu and Ni and a final coat of Cr were applied but restrictions on use of Ni have forced a change to Zn-Cu-Cr coating. Laboratory and service tests show good corrosion resistance. (L17, Cu, Zn, Cr, ST)

964-L. The Reflectivity of Copper Electrodeposits. W. H. Gauvin and C. A. Winkler. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 447-449.

Apparatus and procedure, reflectivity in the absence of an addition agent and in its presence, and measurement of diffuse reflection. Graphs. 16 ref. (L17, P17, Cu)

965-L. Cathode Polarization Potential During the Electrodeposition of Copper. III. Effect of the Cathode Base Upon the Cathode Polarization Potential and the Crystal Structure of the Deposit. L. L. Shreir and J. W. Smith. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 450-456.

Graphs and micrographs. 12 ref. (L17, Cu)

966-L. American Specifications for Phosphate Coatings. *Product Finishing,* v. 5, Oct. 1952, p. 49-53.

U. S. government specifications for use of phosphate coatings in improvement of paint adhesion, protection against corrosion, and protection of bearing surfaces against rust. (L14)

967-L. Dewatering Fluids. *Product Finishing,* v. 5, Oct. 1952, p. 80-89.

Experiments to show merits of fluids for preventing corrosion by removal of water from metal surfaces. Diagrams of equipment. Industrial applications in finishing processes for Mg, Cd, Cr, Cu, Ni, and steel in particular. (L general, R10, ST, Mg, Cd, Cr, Cu, Ni)

968-L. Ultrasonic Cleaning Pays Off for Small Parts. *Steel,* v. 131, Nov. 3, 1952, p. 92-93.

A high-frequency sound wave is beamed through the cleaning solvent or surface detergent to the surface of the submerged workpiece. (L10)

969-L. (German.) **Enriching the Surface of Unalloyed Steel With Tungsten or Molybdenum From Salt Baths.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 369-375.

Surface-diffusion experiments were made for the twofold purpose of saving scarce or expensive metals and of imparting certain surface properties to finished parts of steel or cast iron. Treating the metal in Na tungstate or molybdate baths is shown to increase surface hardness considerably. Effects of time and temperature. Tables, graphs, and photomicrographs. 17 ref. (L15, J28, CN, CI)

970-L. (German.) **More Modern Methods of Pickling Iron and Steel.** Erwin Brauns. *Metalloberfläche,* sec. A, v. 6, Oct. 1952, p. A145-A152.

Procedure, advantages, and limitations. Some American pickling methods are less practical in Germany, because of Germany's lack of natural gas. Graphs. 18 ref. (L12, Fe, ST)

971-L. (German.) **Pickling as a Preparation for Surface Improvement.** R. Petri. *Metalloberfläche,* sec. A, v. 6, Oct. 1952, p. A152-A158.

Effect of chemical and electrolytic pickling with and without inhibitors on the surface roughness and possible film deposition of metals to be electroplated. Photomicrographs, tables, and graphs. (L12)

972-L. (German.) **Procedure and Equipment of Pickling Nonferrous Metals.** Heinz W. Dettner. *Metalloberfläche,* sec. B, v. 4, Oct. 1952, p. B152-B159.

Compositions of pickling baths for Cu and Cu alloys, Ni and Ni alloys, light metals, soft metals (Pb, Sb, Britannia metal, and Zn), and noble metals. Equipment and tabulated data. 37 ref. (L12, EG-a)

973-L. (German.) **The Testing of Tin Deposits on Copper Wires.** Helmut Meiswinkel. *Werkstoffe und Korrosion,* v. 3, Sept.-Oct., 1952, p. 355-357.

Various chemical test methods. Results of tests show advantages of electrolytic plating over hot-dip tinning of wires. Data are charted. (L17, Sn, Cu)

974-L. (German.) **Tinning Aluminum With the Aid of Ultrasonics.** Paul Wenk and Heinrich Boljahn. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 322-324.

A new method and equipment for tinning and soldering Al parts. Photographs, diagrams, and photomicrographs. (L16, K7, Al)

975-L. Tests Prove Ceramic Coatings Prevent Stainless Steel Absorption of Carbon. *Ceramic Industry,* v. 59, Nov. 1952, p. 69.

Application of NBS ceramic coatings A-417 and A-19H to 18-8 stainless steel to prevent adsorption of carbon. (L27, SS)

976-L. Service and Operation Simplified With Wet Blasting. Eugene Anderson. *Industry and Power,* v. 63, Nov. 1952, p. 88-91.

The process and its applications to plastic molds, glass molds, forging dies, and die-casting dies. Photographs. (L10, ST)

977-L. Radioactive Tracers Track Metal Cleaner Effectiveness. J. W. Hensley. *Iron Age,* v. 170, Nov. 13, 1952, p. 151-154.

Use of tracers to study corrosion attack by cleaners, and in evaluation of cleaning effectiveness using soils tagged with radioactive atoms. (L12, R11)

978-L. Porcelain Enamels Serve and Save for Industry. W. A. Barrows. *Iron Age,* v. 170, Nov. 13, 1952, p. 160-161.

Use to coat black steel pipe used for fluxing and degassing Al. (L27, CN)

979-L. Review of Surface Finish Literature. (Continued.) John W. Sawyer. *Machine Design,* v. 24, Oct. 1952, p. 328, 331-333, 334, 336, 338, 340, 342, 344, 346, 348; Nov. 1952, p. 286, 288, 290, 292, 294.

Bibliography of literature published during years 1945, 1946, and 1947. Includes brief abstracts. Concluding part consists entirely of subject index to first two parts. (L general)

980-L. Economical Finishing With Vacuum Metalizing. George W. Carr. *Metal Finishing,* v. 50, Nov. 1952, p. 60-64.

Advantages and applications of the process. Equipment. (L25)

981-L. Anodizing Aluminum With Sulfamic Acid; Comparison of Sulfuric, Oxalic, and Sulfamic Acid Processes. (Concluded.) Sakae Tajima, Yasuyuki Kimura and Toshiro Fukushima. *Metal Finishing,* v. 50, Nov. 1952, p. 65-69, 74.

Experimental procedure and results. Includes data on resistance to corrosion and abrasion. Graphs. 10 ref. (L19, R general, Q9, Al)

982-L. Electrodeposition of Zinc on Uranium Metal. Louis Silverman. *Metal Finishing,* v. 50, Nov. 1952, p. 75.

Cleaning cycle, chemical plating bath, and plating operation. (L17, Zn, U)

983-L. Nomogram for Analysis of Watts Type Nickel Plating Solutions. I. Goldman. *Metal Finishing,* v. 50, Nov. 1952, p. 76-77.

984-L. Automatically Controlled Galvanizing Kettles. *Metal Industry,* v. 81, Oct. 31, 1952, p. 349-350.

Pneumatic and electrical automatic control systems for metal galvanizing. Use of either depends on working conditions and desired accuracy of control. (L16, Zn, CN)

985-L. An Experience in Electrolytic Etching. W. B. Hislop. *Process Engravers' Monthly,* v. 59, Oct. 1952, p. 293-294.

Use for halftone work on Cu with hot-top enamel. Experiences of past 20 years. (L13, Cu)

986-L. Composite Metals: A New Key to Design Flexibility. Jerome Ott-

mar. *Product Engineering,* v. 23, Nov. 1952, p. 153-157.

Metallurgically bonded metal combinations can be used to overcome limitations of single metals and to conserve critical and costly materials. Variety of composites now available include Al-base composites, Fe and steel-base composites, stainless-steel-clad metals, special spring materials, brazing metal cladding, thermostat metals, rare and precious-metal clad materials, and lead-clad metals. Photographs and tables.
(L24, Al, ST, CN, SG-b, f, s, EG-c)

987-L. Hard Chrome Plating on Aircraft Parts. Gilbert C. Close. *Products Finishing,* v. 17, Nov. 1952, p. 32-36, 38, 40.

General discussion.
(L17, Cr, CN, AY)

988-L. Performance of Pre-Treatment Primers as Revealed by Accelerated Tests. *Products Finishing,* v. 17, Nov. 1952, p. 46, 48, 52, 54, 56.

General discussion with tabulated data. The primers were applied to Al sheet, 60-40 brass sheet, and mild steel sheets—bare and with Sn, Zn, and Cd coatings. Different chemical pretreatments were used.
(L14, Al, Cu, CN)

989-L. Abrasive Tumbling Offers Finishing Economies. Allen G. Gray. *Products Finishing,* v. 17, Nov. 1952, p. 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88.

Application at General Electric's West Lynn Meter and Instrument Works, for finishing of numerous small parts. Abrasive tumbling, rolling, burnishing, barrel finishing with Al_2O_3, and application to Zn die castings and steel stampings. (L10)

990-L. Surface Treatment and Finishing of Light Metals, Part 7. S. Wernick. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 1027-1036.

Thickness determination, porosity, adhesion, corrosion resistance, and thermal properties. Tables. 76 ref.
(L general, R general, Al, Mg)

991-L. Silica-Free Enamels. B. K. Niklewski. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 1037-1038, 1040.

Fifty enamels suitable for application to Al in the system P_2O_5-Al_2O_3-B_2O_3 were studied. One particular composition was chosen for further investigation. (L27, Al)

992-L. Volume Plating Method Increases Gun Tube Life. *Steel,* v. 131, Nov. 1952, p. 89.

Brief general discussion. (L17, ST)

993-L. Silver Plating. R. Ruedy. *Technical Information Service, National Research Council* (Canada), Report 10, Aug. 1950, 14 pages.

14 references. (L17, Ag)

994-L. Kinetics of the Formation of Oxide Films on Nickel Foil. Walter J. Moore and James K. Lee. *Transactions of the Faraday Society,* v. 48, Oct. 1952, p. 916-920.

Rate of growth of layers of nickel oxide on Ni was studied from 400 to 900° C. at 10 cm. O_2 pressure. Graphs. 13 ref. (L14, Ni)

995-L. Unionmelt Cladding of Mild Steel Roll by Series-Arc Technique. J. F. Collins, H. I. Shrubsall, and J. L. Wilson. *Welding Journal,* v. 31, Nov. 1952, p. 1050-1051.

Technique for depositing AISI Type 501 metal on a mild steel roll. (L24, CN, SS)

996-L. (German.) **The Alodine Process.** H. Ketterl. *Aluminium,* v. 28, Oct. 1952, p. 346-349.

The process, film characteristics, and successful installations. (L14, Al)

997-L. (Italian.) **Protective Treatment of Magnesium Surfaces.** G. P. Bolognesi and E. Mantovani. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 336-342.

Tests for various surface treatments on two types of Mg alloys. Results of alternate-immersion, salt-spray, and atmospheric exposure tests. 10 ref. (L general, R11, Mg)

998-L. (Italian.) **Evaluation of the True Efficiency of Pickling Inhibitors.** Leo Cavallaro and Liliana Felloni. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 366-370.

Various organic compounds were investigated with respect to their inhibitive effect on pickling of carbon steels. Results are tabulated and interpreted. (L12, CN)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

448-M. Electron Microscope Studies of Evaporated Cadmium and Zinc. R. S. Senett, T. A. McLauchlan, and G. D. Scott. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 370-372.

Employing a technique whereby evaporations are carried out within the specimen chamber of an electron microscope, continuous observations were made on formation of evaporated deposits of Cd and Zn. Micrographs. (M21, N15, Cd, Zn)

449-M. Further Observations on the Macromosaic Structure of Tin Single Crystals. E. Teghtsoonian and Bruce Chalmers. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 388-401.

Studies on bands, or striations, into which single crystals of high-purity Sn, grown by a modified Bridgman method, are partitioned. Tables, diagrams, and micrographs. (M26, Sn)

450-M. The Isolation and Examination of Films From Metal Surfaces: An Improved Technique. T. J. Nurse and F. Wormwell. *Journal of Applied Chemistry,* v. 2, Sept. 1952, p. 550-554.

Technique for removal of oxide films from surfaces of mild steel, stainless steel, and nonferrous metals, which entails reinforcement of the film by polyvinylformal. 10 ref. (M23, CN, SS, EG-a)

451-M. A Correlation of Polarized Light Extinctions With Crystal Orientation in 70 Nickel-30 Copper Alloy. H. C. Vacher. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 149-153.

After etching above alloy to produce an optically anisotropic surface, orientations of 12 crystals were determined by twin-boundary method, and positions of polarized light extinctions (obtained at normal incidence with crossed nicols) were measured. A comparison of orientations with positions of extinctions was made. Tables, diagrams, and micrographs. 10 ref. (M21, Ni, Cu)

452-M. Magnesium-Rich Side of the Magnesium - Zirconium Constitution Diagram. J. H. Schaum and H. C. Burnett. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 155-162.

Refinements were made in the diagram developed by previous investigators. Tables, graphs, diagrams, and micrographs. (M24, Mg)

453-M. Lattice Vacancies and Porosity in Copper-Nickel Alloys. E. C. Ellwood. *Nature,* v. 170, Oct. 4, 1952, p. 580-581.

Experimental data. Photomicrographs. (M26, Cu, Ni)

454-M. (French.) **Study by Means of Atomic Pile Irradiation of the Intergranular and Interdendritic Segregation of Traces of Impurities in Very Pure Aluminum.** Frédéric Montariol, Philippe Albert, and Georges Chaudron. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 18, 1952, p. 477-480.

Weld seams of atomic-pile-irradiated Al specimens were studied, noting the increase in impurities at the grain boundaries. The same phenomenon was also studied by introducing a trace of radioactive Zn into the Al. Includes autoradiographs. (M23, S19, Al)

455-M. (French.) **Evolution at High Temperature of the Micrographic Structure of Refractory Nickel-Chromium Alloys of the 80-20 Type.** J. Poulignier and P. A. Jacquet. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 541-550; disc., p. 551.

Microstructure was studied during heat treatment, tensile testing, and elevated-temperature fatigue testing. The specimens and their preparation; results are interpreted. (M27, Ni)

456-M. (French.) **Graphic Studies of Complex Phenomena.** Jean-Jacques Comhaire. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 561-566.

Proposes a method for preparation of phase diagrams for large numbers of constituents. Various types of presentation, and practical examples. (M24)

457-M. (German.) **The Magnesium-Potassium-Bismuth Ternary System.** Werner Köster and Fritz Sautter. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Aug. 1952, p. 303-307.

The system was investigated on the basis of the Kroll-Betterton process. Regions of primary crystallization, and organization of the concentration surface at room temperature. Diagrams and micrographs. (M24, C26, Mg, Bi)

458-M. (German.) **Contribution to the Tungsten-Silicon System, and the Scale Resistance of Some Silicides.** Richard Kieffer, Friedrich Benesovsky, and Erich Gallistl. *Zeitschrift für Metallkunde,* v. 43, Aug. 1952, p. 284-291.

A review on the basis of the literature. New investigations on the pressure-sintering of tungsten silicides. Proposes a phase diagram of the system on the basis of thermal, microscopic, and radiographic investigations. Mechanism of scaling. Data are tabulated and charted. 33 ref. (M24, R2, W, Si)

459-M. (Russian.) **Dependence of the Quantitative Composition of a Phase on the Ratio of the Atomic Radii for one Class of Intermetallic Phases.** M. A. Styrikovich and Z. L. Miropol'skii. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 321-324.

The structure of phases of the $MgZn_2$ and $MgCu_2$ type and of the MgZn, W_6Fe_7, and $CaZn_5$ types. Data are tabulated and charted. (M27)

460-M. An Electrolytic Etch Technique for Aluminum and its Application to Some Metallographic Problems. E. C. Pearson, G. Marchand, and R. H. Hay. *Canadian Mining and Metallurgical Bulletin,* v. 45, Oct. 1952, p. 598-604; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 358-364.

A polishing technique, together with two anodic etching methods for Al and its alloys. Optical and structural characteristics of the film formed by these etching methods. To what degree these properties of film are related to crystallographic orientation of metallic substrate. Applications to study of recrystallization and twinning phenomena and to study of plastic deformation, banding, and texture estimation are discussed. Micrographs.
(M21, Q24, Al)

461-M. Effect of Internal Strains on Linear Expansion, X-Ray Lattice Constant, and Density of Crystals.

P. H. Miller, Jr., and B. R. Russell. *Journal of Applied Physics*, v. 23, Oct. 1952, p. 1163-1169.

General formulas are derived for shift in X-ray diffraction maxima due to small distortions in simple cubic crystals. A comparison is made of lattice constant, linear expansion, and density expected in crystals containing Frenkel defects, Schottky defects, or F centers. 12 ref. (M26, P10)

462-M. The Constitution of Tantalum-Titanium Alloys. D. Summers-Smith. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 73-76.

Ta-Ti system was investigated by metallographic and X-ray methods, using alloys prepared from Van Arkel Ti and spectrographic-standard Ta. A continuous series of solid solutions is formed between Ta and β-Ti above 885° C.; at 650° C. the solid solution is limited to 70 at.% Ti. Solubility of Ta in α-titanium is estimated as less than 0.5 at.% at 700° C. Micrographs and graphs. (M24, Ti, Ta)

463-M. An Aid for Making Stereographic Plots When Working With Cubic Crystals. Colman Goldberg. *Journal of Metals*, v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 1160-1161.

Tabulated information. (M26)

464-M. An Investigation of Equilibrium Diagram of Fe-As-C System. Hiroshi Sawamura and Toshisada Mori. *Memoirs of the Faculty of Engineering, Kyoto University*, v. 14, July 1952, p. 129-144.

200 specimens of Armco iron, Swedish steel, and Kenjiho white iron were used to determine the Fe-As and Fe-As-C equilibrium diagrams. Dilatometric and microscopic studies were used to determine the influence of As on properties of steel. Tables, micrographs, and graphs. (M24, Fe, CN, CI)

465-M. (German.) **Metallographic and X-Ray Studies of Cold Worked and Fatigue-Stressed Soft Iron.** Hans-Rolf Sander and Max Hempel. *Archiv für das Eisenhüttenwesen*, v. 23, Sept.-Oct. 1952. p. 393-405.

Effects of cold working and fatigue stressing on structures and crystalline states of soft iron before and after annealing at different temperatures. Photomicrographs, graphs, tables, diagrams, and X-ray pictures. 20 ref. (M26, M27, Fe)

466-M. (German.) **A Contribution to the Nickel-Zinc System.** Franz Lihl. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 310-312.

Hardening tests on sintered Ni-Zn alloys indicate that the solubility limit of α solid solution is at a far higher Ni concentration than indicated by Heike, Schramm, and Vaupel's constitution diagram. X-ray studies show that the solubility of Zn in α solid solution at 300° C. is 7-8 wt. %, at most. Graphs and photomicrographs. (M24, Ni, Zn)

467-M. (German.) **The Homogeneity of Sintered Nickel-Copper Alloys.** Josef Kranz. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 335-336.

Explains the lack of complete homogeneity of Ni-Cu alloys even after they were subjected to a long homogenizing treatment. Tabulated data and graphs. (M27, H15, Ni, Cu)

468-M. A Study of Segregation in Metals. W. R. Thomas and W. C. Winegard. *Canadian Metals*, v. 15, Oct. 1952, p. 26.

Segregation in single crystals, bicrystals, and polycrystalline specimens of Pb. Autoradiographs. (M27, Pb)

469-M. Magnesium-Cadmium Alloys. IV. The Cadmium-Rich Alloys; Some Lattice Parameters and Phase Relationships Between 25 and 300° Structure of the $MgCd_3$ Superlattice. Schottky Defects and the Anomalous Entropy. Donald A. Edwards, W. E. Wallace, and R. S. Craig. *Journal of the American Chemical Society*, v. 74, Nov. 5, 1952, p. 5256-5261.

Some of the crystallographic characteristics of Cd-rich alloys. Tables. 28 ref. (M26, Mg, Cd)

470-M. Titanium-Chromium Phase Diagram. F. B. Cuff, N. J. Grant, and C. F. Floe. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 848-853.

Investigation shows presence of a complete series of solid solutions in β-phase, with minimum in the solidus near 50% Cr. An intermetallic compound, $TiCr_2$, forms during cooling from β-solid solution. There is a eutectoid reaction at low-Cr side of system. Phase diagrams and photomicrographs. (M24, Ti, Cr)

471-M. Observations on Twinning in Semicontinuous Cast Aluminum. K. T. Aust, F. M. Krill, and F. R. Morral. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 865-866.

Illustrated and discussed for 99.2% grade. Structure appears to be formed as a result of uneven cooling stresses within the ingots. Photomicrographs. (M27, C5, Al)

472-M. Electron Diffraction From Small Crystals. Chester R. Berry. *Physical Review*, ser. 2, v. 88, Nov. 1, 1952, p. 596-599.

Ag and AgBr crystals were studied. Diffraction effects were calculated. Graphs. (M22, Ag)

473-M. Aluminum Good Yardstick for Steel Grain Size. John W. Alden and Joseph G. Maravec. *Steel*, v. 131, Nov. 1952, p. 96, 98, 101.

Method for determining austenitic grain sizes by means of spectrographic measurement of residual Al. It was applied to TS-4720 steel. Process takes 2 hr. instead of 2 days required for wet-chemical method. (M23, ST)

474-M. Structure of Crystal Boundaries. B. Chalmers. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 293-319.

Reviews experimental work reported in the literature, and discusses results and theoretical ideas advanced. Diagrams, graphs, and tables. 38 ref. (M26)

475-M. Recent Advances in the Electron Theory of Metals. N. F. Mott. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 76-114.

Wave mechanics between a metal and a nonmetal. Magnetic and thermal properties of electrons in metals; metallic cohesion, with reference to transition metals. Elastic constants. Distribution of charge around a dissolved atom and spectroscopy of soft X-rays. Some applications of electron theory to particular kinds of lattice defects. Diagrams, graphs, and tables. 115 ref. (M25, M26, P15)

476-M. Twinning. R. Clark and G. B. Craig. "Progress in Metal Physics, Vol. 3" (Interscience Publishers, New York), 1952, p. 115-139.

Summary of available literature on twinning process in metals dealing with crystallography of twin relationship, conditions under which twins form, and with atom movements involved in twin formation. Metallic examples are Zn, Ag, Cu, Al, Cd, Be, Mg, α-Fe, and β-Sn. Diagrams and tables. 102 ref. (M26, Q24)

477-M. (French.) **Study of the Structure and Properties of the Ferrous Oxide Layer on High-Purity Iron.** R. Collongues and G. Chaudron. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 699-705; disc., p. 705-706.

The study was carried out by means of heat treatments below 570° C. and by electrolytic polishing. Micrographs. 14 ref. (M27, Fe)

478-M. (Book) **Métallographie de l'Aluminium et de ses Alliages: Emploi du Polissage Electrolytique.** (Metallography of Aluminum and Its Alloys: Use of Electrolytic Polishing). P. A. Jacquet. 64 pages. 1952. Office Nation d'Etudes et de Recherches Aeronautiques, Chatillon-sons-Bagneux (Seine), France. 1200 Fr.

Divided into three parts. First: Bibliography of all references to electrolytic polishing occurring in papers published during 1948-50 inclusive. They are classified under electrolyte used, with title of paper plus a short indication of its scope. Second: Details of new techniques used in metallography; in addition to electropolishing, includes information on chemical brightening processes, use of thin anodic films, etch pits, and preparation of very thin specimens. Third: An automatic machine for electropolishing, examples of its use. Micrographs cover a wide range of alloys, including many with complex intermetallic constituents. (M21, L13, Al)

479-M. (Book.) **Fouriersynthese von Kristallen und ihre Anwendung in der Chemie.** (Fourier Synthesis of Crystals and Its Use in Chemistry). Werner Nowacki. 237 pages. 1952. Verlag Birkhäuser, Basel, Switzerland.

A bibliography precedes each section of this comprehensive treatise. Diagrams, tables, and graphs. (M26)

N
TRANSFORMATIONS AND RESULTING STRUCTURES

297-N. Superlattice Studies in the Systems Silver-Magnesium-Tin and Silver-Magnesium-Zinc. W. G. Henry and G. V. Raynor. *Canadian Journal of Physics*, v. 30, Sept. 1952, p. 412-421.

Diagrams, tables, and graphs. (N10, Ag, Mg, Sn, Zn)

298-N. Self-Diffusion at Silver Surfaces. W. C. Winegard and B. Chalmers. *Canadian Journal of Physics*, v. 30, Sept. 1952, p. 422-429.

Surface self-diffusion of Ag on specific crystallographic surfaces of Ag single crystals and on polycrystalline specimens was investigated. Various methods of surface preparation were used. The theory is advanced that "surface" diffusion takes place by a lattice-vacancy mechanism. Tables, graphs, and diagrams. 16 ref. (N1, Ag)

299-N. Further Observations on Dendritic Growth in Metals. F. Weinberg and Bruce Chalmers. *Canadian Journal of Physics*, v. 30, Sept. 1952, p. 488-502.

The direction of dendrite growth was determined as a function of crystallographic orientation for high-purity Sn and Zn, using a single-crystal decanting technique. Rate of dendrite growth in Pb; spacing between dendrite rows of a Pb crystal for varying amounts of supercooling. A mechanism of dendrite growth, compared with experimental observations. Micrographs and graphs. (N12, Sn, Zn, Pb)

300-N. Some Effects of Magnesium on the Formation of Graphite in a Solidifying Cast Iron. C. H. Hughes. *Foundry Trade Journal*, v. 93, Sept. 25, 1952, p. 349-356; Oct. 2, 1952, p.

385-391; Oct. 9, 1952, p. 417-420; disc., p. 420-423.

Hypotheses explaining mechanism of graphite formation and their limitations. Detailed differences between cooling curves of Mg-free and Mg-containing hypo-eutectic cast irons were determined experimentally, and samples of both types of Fe, quenched from closely spaced temperature intervals within and near solidification range, were examined microscopically. Oct. 2 issue: Observations on inoculated Mg-free irons, inoculated Mg-containing irons, and noninoculated Mg-free irons. Oct. 9 issue: Results of a study of centers of crystallization of the eutectic liquid and direct solidification of inoculated Mg-containing irons to austenite and graphite. Tables, graphs, and micrographs. 20 ref. (N8, E25, CI)

301-N. The Quench-Ageing of Iron. Anna L. Tsou, J. Nutting, and J. W. Menter. *Journal of the Iron and Steel Institute*, v. 172, Oct. 1952, p. 163-171.

Optical and electron microscopes were used to follow metallographic changes occurring during precipitation of C from a supersaturated solid solution in α-iron over a range of aging temperatures and times. Results show that precipitates form at random throughout the grains and then grow preferentially at subgrain boundaries; at this stage they have the structure of ε-iron carbide and are plate-like in shape. Tables and photomicrographs. 29 ref. (N7, Fe)

302-N. Carbide Segregation as Related to Tool and Die Life. Stewart G. Fletcher and David Hughes. *Metal Treating*, v. 3, Sept.-Oct. 1952, p. 6-8.

Describes causes and control of segregation in toolsteels. Tests used for its determination. Tables and photographs. (N12, TS)

303-N. (French.) Kinetics of Recrystallization of Aluminum. P. Laurent and M. Batisse. *Revue de Métallurgie*, v. 49, July 1952, p. 485-496; Aug. 1952, p. 593-612.

Reviews work of various investigators; experiments on sheets of 99.35 and 99.91% Al. Results of work on isothermal recrystallization as a function of temperature and of cold hardening. Influence of resaturation, and of annealing temperature, on recrystallization. Results are interpreted in the light of various theories and on the basis of the literature. Tables and graphs. 64 ref. (N5, Al)

304-N. (German.) Aluminum and Gas. Hans Kostron. *Zeitschrift für Metallkunde*, v. 43, Aug. 1952, p. 269-284.

A critical review on the basis of the literature. The Al-air equilibrium below and above the melting point, the state of dissolved H_2, the influence of alloying elements on H_2 absorption, diffusion in Al, and its effects. Data are tabulated and charted. (N12, N1, Al)

305-N. The Recovery of Polycrystalline Aluminium. J. A. Ramsey. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 61-66.

X-ray examination showed that only a few grains in a polycrystalline specimen recovered to a great extent: the majority recovered only partially. Microscopic examination revealed that recovery depended on the presence of kink bands, the degree of recovery in a given grain being contingent on closeness of packing of kink bands. Interpretation of results is given in terms of a dislocation hypothesis. Micrographs. 15 ref. (N4, Al)

306-N. The Solid Solubility of Silver in Aluminium. L. Rotherham and L. W. Larke. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 67-71.

Solid-solubility curve of pure Ag in super-pure Al containing up to 8% Ag was determined by microscopic examination and electrical resistance measurements. Over the range investigated, the two methods agree substantially. Resistance measurements provide a very sensitive means of detecting small structural changes. Photomicrographs and graphs. (N12, Ag, Al)

307-N. Diffusion of Zinc in Alpha Brass. G. P. Chatterjee. *Transactions of the Indian Institute of Metals*, v. 4, 1950, p. 255-268; disc., p. 269.

Diffusion characteristics of an element (particularly those with comparatively high vapor pressures) in a binary alloy may be determined from rate of loss of that element when heated at different temperatures in vacuum. Diagram, graphs, and tables. 13 ref. (N1, Cu, Zn)

308-N. Diffusion of Hydrogen in Steel. U. V. Bhat. *Transactions of the Indian Institute of Metals*, v. 4, 1950, p. 279-286; disc., p. 287-289.

Apparatus for measuring volume of cathodically produced H_2, diffusing through a cylindrical wall of a steel specimen of a uniform thickness. Effects of grain size, composition, and structure. Diagrams, graphs, and tables. (N1, ST)

309-N. (German.) Crystallization and Ingotism in Solidifying Al-Cu-Mg Melts. W. Rosenkranz. *Metall*, v. 6, Oct. 1952, p. 597-608.

Research on the causes of shifting concentration in Al-Cu-Mg alloy shows a clear correlation between segregation and crystallization. Graphs, X-ray pictures, and micrographs illustrate the effects of different cooling conditions on structure of the ingot. (N12, Al)

310-N. (German.) The Effect of the Elements on the Polymorphic Transformation of Cobalt. Werner Köster. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 297-303.

Study reveals that alloying elements reduce or increase the temperature of the A_r and A_c transformation of Co, depending on the position of the element in the periodic system. Results show a clear periodicity of effects with atomic number of the element. Data are compared with F. Wever's statements on the γ-α transformation of iron. Tables and graphs. 26 ref. (N6, Co)

311-N. (German.) The Metallography of Light Metals. IV. The Crystallization of the Residual Melt in Commercial Aluminum Alloys. Hans Kostron and Margarete Schippers. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 303-306.

Results indicate that orientation of the α phase in the eutectic areas of Al-Zn-Mg-Cu alloys has no regular relationship to orientation of the intermetallic compound phase. Photomicrographs. (N12, M26, Al)

312-N. (German.) The Effect of Ag, Au, Cd, Ga, In, Ge Bi, Se, and Te on the Polymorphic Transformation of Cobalt. Werner Köster and Elizabeth Horn. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 333-334.

The constitution diagram of Co is supplemented by determining the effects of above elements on the γ-ε transformation. Graphs. (N6, M24, Co)

313-N. (German.) The Concept of Recrystallization in Metallurgy and Mineralogy. Karl F. Chudoba. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 337-338.

Differences in recrystallization of minerals and metals. Proposes that recrystallization as a mineralogical phenomenon be called "retrocrystallization". 14 ref. (N5)

314-N. Self-Diffusion in Alpha Iron Under Uniaxial Compressive Stress. F. S. Buffington and Morris Cohen. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 859-860.

Results for body-centered high-purity cubic iron at a diffusion temperature of 890° C. The iron used was 99.97% Fe, principal impurities being 0.002% C, 0.003% O, and 0.02% Si. Surface-decrease method of self-diffusion analysis was employed, and Fe was tracer element. Specimens were loaded in compression between two quartz disks by means of a lever system operating through a vacuum seal. Results are charted and expressed by means of an empirical equation. (N1, Fe)

315-N. Segregation of Two Solutes, With Particular Reference to Semiconductors. W. G. Pfann. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 861-865.

Simultaneous segregation of two solutes during directional solidification of an ingot is treated mathematically on basis of simplifying assumptions. Expressions are derived for difference in concentration of two solutes, and for location and concentration gradient of a *pn* barrier formed in a semiconductor by segregation of a donor and an acceptor. Examples for Ge. 11 ref. (N12, Ge)

316-N. Concentration Dependence of Diffusion Coefficients in Metallic Solid Solution. Donald E. Thomas and C. Ernest Birchenall. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 867-873.

Diffusion coefficients in Cu-Pd system were determined as a function of temperature and concentration. Concentration dependence is slight at both extremes of concentration and strong at intermediate concentrations. Diffusion coefficient approaches value of self-diffusion coefficient of Cu in dilute Pb solution. Redetermination of dependence of diffusion coefficients at the high-Cu end of the Cu-Ni system confirmed a strong dependence of diffusion coefficients on composition in relatively dilute solutions. Individual diffusion coefficients for Cu and Ni atoms were found by use of markers at 89.9% Cu. Graphs and tables. 23 ref. (N1, Cu, Pd, Ni)

317-N. Effect of Simultaneous Strain on Subgrain Growth. Jun Hino, Paul G. Shewmon, and Paul A. Beck. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 873-874.

Recently, Wood and Scrutton found that rate of subgrain growth upon annealing increased very considerably if, simultaneously, a creep strain was applied at a low strain rate. Experiments on high-purity Al strip were carried out in order to confirm Wood and Scrutton's results by direct metallographic observation. Also, information was sought as to minimum creep strain necessary to produce this effect. Micrographs and diffraction patterns. (N3, Al)

318-N. Strain Ageing in Iron and Steel. J. D. Fast. *Philips Technical Review*, v. 14, Aug. 1952, p. 60-67.

Aging of steel, particularly mild steel, plastic deformation of metal, theoretical considerations on strain aging, strain-aging experiments with specially prepared commercial Fe alloys, effect of Mn, and blue brittleness. 10 ref. (N7, CN, Fe)

319-N. Preparation of Germanium Single Crystals. Louise Roth and W. E. Taylor. *Proceedings of the I.R.E.*, v. 40, Nov. 1952, p. 1338-1341.

Two methods for preparation in which a vacuum furnace with induction heating is used. Diagram and micrographs. 21 ref. (N12, Ge)

320-N. The Growth and Orientation of Single Crystals of Indium. A. J. Goss and E. V. Vernon. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 905-906.

Method for In growth and determination of crystallographic orientation by optical etch-pit reflection methods. (N12, In)

321-N. Crystallography of Transformations. J. S. Bowles and C. S. Barnett. "Progress in Metal Physics. Vol. 3." (Interscience Publishers, New York), 1952, p. 1-41.

General review of and contribution to knowledge of atom movements accompanying transformations, in transforming material, in boundaries of transforming regions, and in surrounding matrix. Micrographs and diagrams. 90 ref. (N general, M26)

322-N. Recrystallization and Grain Growth. F. E. Burke and D. Turnbull. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 220-292.

Theoretical investigation plus reviews of previous work. Graphs and micrographs. 110 ref. (N4, N5)

323-N. (French.) **Order - Disorder Transformations in Ternary Alloys.** Emile Josso. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 727-732.

Dilatometric and thermomagnetic methods were used to study the above in ferronickel and ferrocobalt alloys, containing small amounts of Cu, Mo, and Cr. Data are charted. 15 ref.
(N10, Fe, Ni, Co, Fe-n)

324-N. (French.) **Some Characteristics of the Mechanism of Fusion.** G. C. Kuczynski. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 733-735; disc., p. 735-736.

Wires of Cu, Ni, and Fe were wrapped around Cu cylinders. Metallographic studies were made to investigate diffusion between the two metals. Effects of vapor pressure were determined. (N1, Cu, Ni, Fe)

325-N. (Italian.) **Hardening of Alloys by Oxidation.** V. Gottardi. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 424-431.

Ag alloys, containing Al, Cd, Sb, or Mg-Cd, and Mg-Al were investigated. Diffusion of O_2, numerical values of diffusion and activation energies, rate of oxidation, and resulting hardening. Data are tabulated and charted. (N1, Q29, Ag)

326-N. (Italian.) **The Application of an X-Ray Spectrometer With Geiger-Müller Counter for Direct Determination of the Rate of Structural Changes.** U. Rösler and W. Ruff. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 475-487.

A new experimental and mathematical method demonstrated on an Al bronze, and showing transformations of β, β', β_1 α, and γ_2 phases. Graphs. (N6, M23, Cu)

P

PHYSICAL PROPERTIES AND TEST METHODS

567-P. Universal Skin-Effect Chart for Conducting Materials. Harold A. Wheeler. *Electronics*, v. 25, Nov. 1952, p. 152-154.

Skin depth, napier depth, and depth of penetration of current in various nonmagnetic and nonferrous metals, solutions, and ground at frequencies ranging from 1 cps. to 1,000,000 mc. Graph and tables. 16 ref. (P15, EG-a)

568-P. The Heat Capacity of Gallium From 15 to 320° K. The Heat of Fusion at the Melting Point. George B. Adams, Jr., Herrick L. Johnson, and Eugene C. Kerr. *Journal of the American Chemical Society*, v. 74, Oct. 5, 1952, p. 4784-4787.

Measurements were made on five samples of Ga over above range. A table of thermodynamic functions was prepared for Ga at smoothed values of temperatures. Tables. 14 ref. (P12, Ga)

569-P. The Vapor Pressure of Germanium. Alan W. Searcy. *Journal of the American Chemical Society*, v. 74, Oct. 5, 1952, p. 4789-4791.

Determined over the 1510-1882° K. range by the Kundsen effusion method. Tables. 19 ref. (P12, Ge)

570-P. Contact Resistance. Wm. B. Kouwenhoven and Clarence W. Little. *Welding Journal*, v. 31, Oct. 1952, p. 457s-465s.

Laws that apply to resistance offered by electric contacts used in resistance welding and in electric circuits. Metals used in investigation were Al, brass, bronze, Ag, and stainless. Photomicrographs, diagrams, and graphs.
(P15, K3, Al, Cu, Ag, SS)

571-P. Selection and Processing of Chromium-Nickel Stainless Steels for Magnetic Applications. F. K. Bloom and J. S. White. *Wire and Wire Products*, v. 27, Oct. 1952, p. 1036-1038, 1126-1127.

Effect of chemical composition and processing on magnetic properties of Cr alloy and Cr-Ni alloy steels. Processing refers largely to the wiredrawing operation.
(P16, F28, SS)

572-P. (French.) **The Ferromagnetism of Certain Gadolinium-Magnesium Alloys.** Francoise Gaume-Mahn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 235, Aug. 4, 1952, p. 352-354.

Results on alloys which the amount of Gd exceeds 68%. Graph. (P16, Gd, Mg)

573-P. (French.) **The Magnetic Behavior of Rhenium Associated With Palladium.** Jules Wucher and Nicholas Perakis. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 235, Aug. 11, 1952, p. 419-421.

Experimental results of a thermomagnetic study of the Re-Pd system. (P16, Re, Pd)

574-P. (French.) **Thermo-Electric Measurements on Silicon P.** Jean Savornin and France Savornin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 235, Aug. 18, 1952, p. 465-468.

Emf. of thermocouples consisting of a Si bar plus a Cu wire was measured. The Si used is positive in relation to the Cu; the thermoelectric power in relation to the Cu is 700 MV. per degree, for 99.85% purity. (P15, Cu, Si)

575-P. (French.) **Thermal Conductivity. Its Importance to the Behavior of Heat-Resistant Materials.** M. Pommellet. *Métaux: Corrosion—Industries*, v. 27, July-Aug. 1952, p. 318-324.

Possibilities of theoretical calculation, and of practical utilization of the method in nonisotropic media. (P11, SG-h)

576-P. (French.) **Influence of Sulfur on the Properties of Cementite.** J. Drain and A. Michel. *Revue de Métallurgie*, v. 49, Aug. 1952, p. 585-588; disc., p. 589.

Experimental arrangement for the investigation. The influence of sulfur on Curie point, stability, and rate of the austenitic-ferritic transformation. Diagrams. 11 ref.
(P16, N8, ST)

577-P. (German.) **Semiconducting Properties of Intermetallic Compounds (CdSb).** Eduard Justi and Günter Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, v. 4, 1952, p. 107-116.

Tabulated data, charts, and references. (P15, Cd, Sb)

578-P. (German.) **Research on the Occurrence of Separate Processes in Magnetostriction.** Eduard Bailitis, Curt Hagen, and Hans Heinrich Rust. *Zeitschrift für Angewandte Physik*, v. 4, Aug. 1952, p. 284-291.

Reversible and irreversible processes in magnetostriction. Magnetostriction is composed of different distinct processes. Investigation reveals three processes which vary with remanence and coercive force of the material. Data for several magnetic metals and alloys. 11 ref. (P16, SG-n)

579-P. (German.) **Mechanism of Resistance Change in a Magnetic Field.** A. Nedoluha and K. M. Koch. *Zeitschrift für Physik*, v. 132, Aug. 1952, p. 608-620.

A new diagram for conductors of complex conduction mechanism, especially alloys, is shown to explain the above more clearly than customary models of the electron theory. Diagrams. 10 ref. (P15)

580-P. (Russian.) **The Specific Catalytic Activity of Metallic Platinum.** V. S. Chesalova and G. K. Boreskov. *Doklady Akademii Nauk SSSR*, new ser., v. 85, July 11, 1952, p. 377-379.

A study was made of the specific activity of Pt prepared by different methods and having different specific surfaces. (P13, Pt)

581-P. Thermodynamic Properties of the Liquid Ternary System Bismuth-Cadmium-Tin. Svante Mellgren. *Journal of the American Chemical Society*, v. 74, Oct., 20, 1952, p. 5037-5040.

Activity of cadmium in liquid Bi-Cd-Sn alloys was determined with aid of e.m.f. measurements. From these values, integral molar excess free energy and partial molar excess free energies of all components were calculated. Tables and graphs. (P12, Bi, Cd, Sn)

582-P. Principles Involved in the Formation of Iron Alloys. K. W. Andrews. *Metal Treatment and Drop Forging*, v. 19, Oct. 1952, p. 425-432.

Develops a number of empirical relationships. Includes study of experimental facts to deduce principles of classification, semiquantitative study of diagrams from a thermodynamic viewpoint, and explanation of formation of alloys and their constitution and properties in terms of modern electronic theory of atomic structure. Graphs and diagrams. 24 ref. (P12, M25, Fe)

583-P. Superconductivity of Rhenium. J. G. Daunt and T. S. Smith. *Physical Review*, ser. 2, v. 88, Oct. 15, 1952, p. 309-311.

Report on measurements made in the liquid helium temperature region of the magnetic threshold curve of Re by observations of magnetic moment of powdered samples. Graphs and tables. 14 ref. (P15, P16, Re)

584-P. The Superconductive Transition in Tantalum. H. Preston-Thomas. *Physical Review*, ser. 2, v. 88, Oct. 15, 1952, p. 325-327.

Use of small coreless coils allows simultaneous measurement of resistive and magnetic transitions in Ta. Results are explained on basis of a modification of a two-phase model and critical field-temperature curves are derived for bulk metal and for filament material. Graphs.
(P15, P16, Ta)

585-P. Mean Free Paths of Electrons in Evaporated Metal Films. F.

W. Reynolds and G. R. Stilwell. *Physical Review*, ser. 2, v. 88, Oct. 15, 1952, p. 418-419.

Determination using thin films of Cu and Ag. Compares measured and calculated resistance - temperature coefficients. (P15, M25, Cu, Ag)

586-P. Sensitive Recording Alternating-Current Hall Effect Apparatus. E. M. Pell and R. L. Sproull. *Review of Scientific Instruments*, v. 23, Oct. 1952, p. 548-552.

Apparatus which will measure mobilities of the order of 10^{-2} sq. cc. per volt-sec. in semiconductors, and is especially suited for measuring Hall voltage in samples of very low conductivity. (P15)

587-P. Some Studies on the Behaviour of Metals and Alloys at Elevated Temperatures Under Vacuum. W. Baukloh and G. P. Chatterjee. *Transactions of the Indian Institute of Metals*, v. 4, 1950, p. 239-252; disc., p. 252-254.

Behavior of α-β brass when heated in vacuum at different temperatures for different periods of time. It was found that, when a piece of polished unetched brass is heated under vacuum, Zn volatilizes from grain boundaries at a faster rate than from the grains, resulting in vacuum etching which occurs at different temperatures depending on time and amount of cold reduction. Loss of weight due to volatilization was found to be a function of temperature, time, surface area, and amount of cold rdeuction. (P12, Cu)

588-P. (German.) **Standard Resistors of Gold-Chromium Alloy.** A. Schulze and H. Eicke. *Zeitschrift für Angewandte Physik*, v. 4, Sept. 1952, p. 321-324.

Demand for greater accuracy in electrical measuring led to development of Au-Cr alloys to replace manganin. Different designs of Au-Cr alloy resistors. Data are tabulated. (P15, T1, Au)

589-P. (German.) **Perturbance Conductivity and Semiconductivity of Intermetallic Compounds. II.** E. Justi and G. Lautz. *Zeitschrift für Naturforschung*, v. 7a, Sept. 1952, p. 602-613.

Effect of temperature on electrical conductivity resistance change in a magnetic field, differential thermoelectric force, and rectifying properties of CdSb. Results show that stoichiometric CdSb is an intrinsic semiconductor. Graphs, diagrams, and tables. 17 ref. (P15, Cd, Sb)

590-P. The Heat of Combustion of Neodymium. Elmer J. Huber, Jr., and Charles E. Holley, Jr. *Journal of the American Chemical Society*, v. 74, Nov. 5, 1952, p. 5530-5531.

Investigation of the heats of formation of rare-earth oxides from which the metals can be obtained, specifically work on Nd. (P12, Nd, EG-g)

591-P. Solid State Physics in Electronics and in Metallurgy. W. Shockley. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 829-842.

Urges that metallurgical industry support fundamental research on dislocations in their own laboratories and in universities. Experience of the author is drawn largely from two fields in solid-state physics —transistor electronics and dislocation theory, and their relationship. Some new results exhibit features of dislocations with a clarity comparable to that achieved for holes and excess electrons in semiconductors. Experimental examples are concerned with growth spirals, grain-boundary energies, strength of small metal crystals, and surface hardening of Al crystals. Numerous diagrams and illustrations. 28 ref. (P12, P15, M26)

592-P. Thermal Buckling of Plates. Myron L. Gossard, Paul Seide and William M. Roberts. *National Advisory Committee for Aeronautics*, Technical Note 2771, Aug. 1952, 39 pages.

Approximate method, based on large-deflection plate theory, for calculating deflections of flat or initially imperfect plates subject to thermal buckling. This method was used to determine deflections of a simply supported 75S-T6 Al-alloy panel subjected to a tentlike temperature distribution over the plate surface. Schematic diagrams and tables. (P11, Al)

593-P. Photon Absorption Cross Sections in Bismuth and Tantalum. J. Halpern, R. Nathans, and A. K. Mann. *Physical Review*, ser. 2, v. 88, Nov. 1, 1952, p. 679-680.

Measured by a method of delayed neutron detection. 11 ref. (P10, Bi, Ta)

594-P. Properties of Silicon and Germanium. Esther M. Conwell. *Proceedings of the I.R.E.*, v. 40, Nov. 1952, p. 1327-1337.

Latest experimental information on those fundametal properties of Ge and Si which are of device interest, currently or potentially. Electrical properties, especially carrier density and mobility; detail; physical background. Tables and graphs. 50 ref. (P15, Si, Ge)

595-P. The Temperature Variations of the Magnetization of Nickel in Low and Moderate Fields. R. S. Tebble, J. E. Wood, and J. J. Florentin. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 858-871.

Results of measurements of reversible changes in magnetization accompanying changes in temperature in annealed Ni. Results in relation to work of Bates and others on temperature changes produced by adiabatic changes in magnetization (the magnetocaloric effect). Graphs. 13 ref. (P17, Ni)

596-P. Antiferromagnetism and Ferrimagnetism. Louis Neel. *Proceedings of the Physical Society*, v. 65, sec. A, Nov. 1, 1952, p. 869-885.

Present knowledge of antiferromagnetism, including ferrimagnetism. Some phenomena concerning magnetic behavior of certain ferrites and of pyrrhotite. Graphs and diagrams. 32 ref. (P17, SG-n, p)

597-P. The Effect of Temperature of Deformation on the Electrical Resistivity of Cold-Worked Metals and Alloys. T. Broom. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 871-881.

Apparatus used to draw wires of Al, Cu, Ni, Fe, 50-50 Ag-Au, 75-25 brass, and Ag_3Mg at temperatures between −183 and 100° C., and to measure their resistances at the temperature of drawing. Results suggest that a unified theory of effect of deformation on resistivity of both pure metals and alloys can be based on stacking faults. Graphs and tables. 22 ref. (P15, Al, Cu, Ni, Fe, Ag, Au, Mg)

598-P. Spin Degeneracy and the Theory of Collective Electron Ferromagnetism. A. B. Lidiard. *Proceedings of the Physical Society*, v. 65, sec. A, Nov. 1, 1952, p. 885-893.

Theoretical analysis with application to Fe, Co, and Ni. 15 ref. (P17, Fe, Co, Ni)

599-P. A Critical Study of the Asymmetrical Temperature Gradient Thermoelectric Effect in Copper and Platinum. N. Fuschillo. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 896-904.

Proves a rigorous test of existence of above by correlating effects produced by symmetrical gradients with those produced by gradients of pronounced asymmetry at both high and low temperatures and at many points along considerable lengths of wire. Attention was paid to elimination of strain, impurity, and hidden sources of error. Means of reducing inhomogeneity effects in Cu wires. Graphs. 12 ref. (P15, Cu, Pt)

600-P. Resistance of Germanium Contacts. J. B. Gunn. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 908-909.

Brief theoretical analysis. (P15, Ge)

601-P. Ferromagnetism. Ursula M. Martins. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 140-175.

Effect of location in periodic table, saturation magnetization, energy relationship in ferromagnetic crystals, domain configurations, theories of coercive force, polycrystalline materials, and ferromagnetic permeability. Diagrams, graphs, and micrographs. 64 ref. (P17, SG-n, p)

602-P. Properties of Metals at Low Temperatures. K. C. MacDonald. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 42-75.

Summarizes recent progress in observation of fundamental electrical and thermal properties, primarily in low-temperature region. Specific heats and electrical conductivity in particular. Graphs and tables. 137 ref. (P11, P12, P15)

603-P. (Book.) **Mixtures. The Theory of the Equilibrium Properties of Some Simple Classes of Mixtures, Solutions, and Alloys.** E. A. Guggenheim. 270 pages. 1952. Oxford University Press, Amen House, Warwick Sq., London E.C. 4, England.

Applies statistical thermodynamics to certain models of solid, liquid, and gaseous mixtures. Includes chapters on classical and statistical thermodynamics of mixtures; ideal, regular, and dilute solutions; lattice imperfections; superlattices; athermal and non-athermal mixtures; and macromolecular solutions. (P12, M26)

604-P. (Book.) **Progress in Metal Physics. Vol. 3.** Bruce Chalmers, editor. 334 pages. 1952. Interscience Publishers, 250 Fifth Ave., New York 1. $8.00.

Reviews of present state of knowledge in specialized aspects of physical metallurgy and metal physics, by various authors. Each of the eight articles is separately abstrated. (P general, N general)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

1007-Q. Surface Effects in Plastic Deformation of Metals. A. F. Brown. *Advances in Physics*, v. 1, Oct. 1952, p. 427-479.

Experiments in which Al was used to discover whether internal slip has any relation to surface slip. Reviews previous work using Zn, Cd, brass, and Sn. Theories of the spacing and origin of slip bands. Graphs, diagrams, and micrographs. 78 ref. (Q24)

1008-Q. Alloying Ferritic Steels for Creep Resistance. H. W. Kirkby. *Alloy Metals Review*, v. 8, Sept. 1952, p. 2-8.

Creep resistance of carbon and alloy steels with additions of Mo, Va, W, and Cr in varying amounts and combinations. Points out that higher Cr steels are more corrosion resist-

ant than low-alloy steels. Graphs and tables. 16 ref.
(Q3, R general, CN, AY)

1009-Q. Comparisons at Elevated Temperatures of Some Commercial Grades of Ferritic Cast Steels. H. W. Wyatt, J. W. Bolton, and M. L. Steinbuch. *American Society of Mechanical Engineers,* Paper 52-SA-53, Apr. 9, 1952, 14 pages.

Some direct mechanical test comparisons of cast steel Grades WC4, WC5, WC6, and WC9 of ASTM Specification A217-49T. Materials studied are from commercial heats. All variables in manufacture, treatment and composition (aside from prescribed "alloy elements") are held as closely alike as possible. Tests show that, at temperatures under consideration, nominal 1% Mo grades WC-5 and WC-9 are higher in "creep strength" than nominal 0.5% Mo grades WC-4 and WC-6. Grade WC-5 showed, in this direct comparison, higher "stress-rupture strength" than the other three grades. Tables and graphs. 37 ref. (Q3, Q4, CI)

1010-Q. A Survey of "Statistical Effects" in the Field of Material Failure. Waloddi Weibull. *Applied Mechanics Reviews,* v. 5, Nov. 1952, p. 449-451.

Theoretical discussion and literature review. 63 ref.
(Q general, S12, S21, ST, CI)

1011-Q. Curves for the Determination of the Stresses in Rotating, Nonuniformly Heated, Disks by the Keller Method. F. Salzmann and W. Kissel. *Escher Wyss News,* v. 23-24, 1950-51, p. 69-82.

Includes mathematical details of development and use. (Q25)

1012-Q. Investigation of Materials for Steam Turbine Manufacture. W. Stauffer. *Escher Wyss News,* v. 23-24, 1950-51, p. 91-97.

Facilities of the Escher-Wyss organization. Typical data are tabulated, charted, and illustrated. Includes mechanical testing, nondestructive testing, metallographic and spectrographic investigations.
(Q general, S13, S11, M21, T5)

1013-Q. Study Metal Behaviour With Large Metal Crystals. Robert Maddin and N. K. Chen. *Iron Age,* v. 170, Oct. 23, 1952, p. 108-111.

How plastic behavior of metals is being studied at Johns Hopkins University. Single crystals of high-melting-point metals such as Mo, Ta, Cb, and W have been grown. Typical is Mo metal. The commercial pressed sintered and arc-melted product is brittle. But pure Mo crystals can be extended 57%, rolled 98%. Includes information on Al, brass, and other metals. Graphs, micrographs, and macrographs.
(Q23, H general)

1014-Q. Sigma-Phase Embrittlement in 25 Cr-20 Ni Heat-Resisting Steels. J. I. Morley and H. W. Kirkby. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 129-142.

Metallurgical observations relating to occurrence of sigma phase in ferrite-free Cr-Ni bar steels. Effect of variable grain size arising from different annealing temperatures on distribution of constituents, on their rates of precipitation, and on tensile and impact properties of steels after complete precipitation of carbide and sigma phases. Data show how composition of steels may be adjusted to reduce their sigma content if necessary. Graphs, tables, and photomicrographs. 10 ref.
(Q23, M27, SS, SG-h)

1015-Q. Effect of Direction of Rolling, Direction of Straining, and Ageing on the Mechanical Properties of a Mild-Steel Plate. Constance F. Tipper. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 143-148.

Series of experiments was conducted to determine effects of plastic strain and aging on notch-impact strength and yield point. Direction of rolling was found to be most significant in Izod impact tests, lowering of these values after prestrain being chiefly due to work hardening and strain aging. Results charted. 16 ref. (Q general, CN)

1016-Q. Influence of Prior Strain History on the Tensile Properties and Structures of High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 167-186.

Results of tests made to evaluate effects of prestraining different amounts in creep under tension at 110, 250, and 300° F., of cold drawing on tensile properties at room temperature, and on hardness and structures produced in fractured specimens. Tables, graphs, micrographs, and photographs.
(Q27, Q24, M27, Cu)

1017-Q. New Drawing Brass Cuts Finishing Costs. S. G. Kelley, Jr. *Materials & Methods,* v. 35, Mar. 1952, p. 82-83.

"Formbrite", developed by American Brass Co., is not a new alloy, but is the result of a new process of manufacturing that can be applied to most of existing copper alloys, particularly brasses. As a brass, Formbrite can be obtained in alloys ranging from gilding metal (95 Cu + 5% Zn) to yellow brass of 63-37 Cu-Zn content. Produced by special methods of rolling or drawing and annealing, it has a grain size of 0.012 mm. or under. Very good polishing and finishing characteristics, high tensile strength, hardness, and excellent ductility are claimed. Applications.
(Q23, Q29, F23, Cu)

1018-Q. "Stretcher-Strains"—Their Occurrence in Nickel Silver. R. Ergang. *Metal Industry,* v. 81, Oct. 3, 1952, p. 261-264.

Survey of stress-strain curves of nickel silver and brass and incidence of "stretcher strains" locates these phenomena in relation to yield point, elongation, and grain size of material, as well as indicating influence of time and temperature on their formation. Graphs. (Q24, Cu)

1019-Q. An Experimental Investigation of the Behavior of 24S-T4 Aluminum Alloy Subjected to Repeated Stresses of Constant and Varying Amplitudes. Herbert F. Hardrath and Elmer C. Utley, Jr. *National Advisory Committee for Aeronautics,* Technical Note 2798, Oct. 1952, 23 pages.

Device for adapting Moore rotating-beam fatigue-testing machines for tests in which amplitude of stress is continuously varied. Results are analyzed by computing summation of cycle ratios. Values obtained in this analysis were found to be influenced by shape of the frequency-distribution curve. Tables and stress curves. (Q7, Al)

1020-Q. A Theoretical and Experimental Investigation of the Influence of Temperature Gradients on the Deformation and Burst Speeds of Rotating Disks. P. I. Wilterdink, A. G. Holms, and S. S. Manson. *National Advisory Committee for Aeronautics,* Technical Note 2803, Oct. 1952, 45 pages.

Influence of temperature gradients. Validity of recently developed method of calculating plastic flow in disks by comparing calculated results with experimental observations on Inconel "X" disks. Graphs, tables, and diagrams. 14 ref. (Q24)

1021-Q. Tracer Technique for Studying Gear Wear. V. N. Borsoff, D. L. Cook, and J. W. Otvos. *Nucleonics,* v. 10, Oct. 1952, p. 67-69.

Briefly mentions previous methods of evaluating gear wear. Tracer technique in reference to apparatus, activity of gears, calibration, and procedure. (Q9, S19)

1022-Q. The Mechanism of Rolling Friction. D. Tabor. *Philosophical Magazine,* ser. 7, v. 43, Oct. 1952, p. 1055-1059.

Investigation made of friction and surface damage produced when a hard steel ball rolls between flat parallel surfaces of a softer metal. (Q9, ST)

1023-Q. The Deformation of Silver at High Temperature. A. P. Greenough. *Philosophical Magazine,* ser. 7, v. 43, Oct. 1952, p. 1075-1082.

A new explanation of development of kinking is advanced to account for experimental observations, and it is shown that surface-energy effects can give rise to offsetting in a direction which causes wires to shorten. Tables and diagrams. 13 ref. (Q24, Ag)

1024-Q. The Mechanism of Boundary Lubrication. F. P. Bowden. *Third World Petroleum Congress, Proceedings,* sec. VII, 1951, p. 328-342.

Mechanism of metallic friction and wear, and part played by localized adhesion at points of sliding contact. Mechanism of boundary lubrication. Electron diffraction studies of structure and orientation of lubricant films. Chemical attack. Data for a variety of metals. Electron micrographs, diagrams, and tables. 22 ref. (Q9, R7)

1025-Q. The Expression of Spot-Weld Properties. Julius Heuschkel. *Welding Journal,* v. 31, Oct. 1952, p. 931-943.

Derives series of empirical solutions which permit direct expression of common mechanically determined properties of C-Mn steel spot welds for materials within ordinary thickness, strength, and composition ranges. These expressions permit direct conveyance of a large amount of test experience in a simple, terse, usable form. The equations apply only to conventional single impulse spot welding procedures on welds stressed at normal temperatures.
(Q general, K3, CN)

1026-Q. The Effect of Strain-Rate on Twinning and Brittle Fracture. D. Rosenthal and C. C. Woolsey, Jr. *Welding Journal,* v. 31, Oct. 475s-492s.

Relationship of strain rate, temperature and brittle fracture in low-carbon steel as determined in simple tension. Experimental results. Diagrams, graphs, and photomicrographs. 35 ref. (Q27, Q24, CN)

1027-Q. The Nature of Cleavage Fracture in Steel. H. M. Miekkoja. *Welding Journal,* v. 31, Oct. 1952, p. 493s-501s.

Factors which affect cleavage fracture in steel are defined as artificial notches, inhomogeneities of structure, ductility of material, and its structure and composition. Experimental data for several carbon and low-alloy steels are tabulated and charted. 31 ref. (Q26, CN, AY)

1028-Q. Hard-Facing Alloys of the Chromium Carbide Type. Howard S. Avery and Henry J. Chapin. *Welding Journal,* v. 31, Oct. 1952, p. 917-930.

Engineering properties (hardness, abrasion resistance, erosion resistance, oxidation resistance, hot hardness, creep resistance, compression strength, and behavior under impact) of deposits of high-Cr iron in which C and Cr are combined to provide a considerable volume of hard carbides. Graphs, tables, and photomicrographs. 20 ref.
(Q general, R general, L24, Cr, C-n)

1029-Q. Significance of the Elongation Test on Wire. Howard J. Godfrey. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1015-1022, 1031.

Factors which affect the elongation test. How deformation which takes place during tensile testing

can be used to measure ductility. Concerned with hard-drawn wire in the as-drawn condition and after various treatments. Graphs. (Q27, Q23, CN)

1030-Q. Creep and Relaxation of High Strength Steel Wires at Room Temperature. Gordon T. Spare. *Wire and Wire Products*, v. 27, Oct. 1952, p. 1058-1061, 1119-1120.

Nominal amounts of creep and relaxation occur in high-strength steel wires subject to high sustained stress or strain. Changes affected by various treatments of a given wire appear to be specifically related to elongation ductility. Graphs. (Q3, AY)

1031-Q. (French.) **Lubrication of Steel Surfaces Treated in a Sulfur Bath.** Frédéric Morel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 235, July 28, 1952, p. 284-286.

Effects of sulfur bath treatment on coefficient of friction and surface finish. (Q9, ST)

1032-Q. (French.) **Temper Brittleness of Steel.** J. M. Vialle. *Metaux: Corrosion—Industries*, v. 27, July-Aug. 1952, p. 281-301.

A review on the basis of the literature. How temper brittleness manifests itself, laws governing these phenomena, and influence of various factors. Mechanism for temper brittleness. Micrographs, macrographs, and diagrams. 68 ref. (Q23, ST)

1033-Q. (French.) **Microhardness.** Adrien Saulnier. *Revue de l'Aluminium*, v. 29, July-Aug. 1952, p. 262-266.

Theoretical explanation of microhardness, or application of hardness principles to surfaces covering only a few microns. Applications and methods. Apparatus for measurement and recording. (Q29)

1034-Q. (French.) **Application of Microhardness to Some Constituents of Cast, Binary Aluminum Alloys.** Adrien Saulnier. *Revue de l'Aluminium*, v. 29, Sept. 1952, p. 301-307.

Results of a series of tests on various types of Al and Al alloys. The usefulness of microhardness for control as well as for research. Micrographs and table of test data. (Q29, Al)

1035-Q. (French.) **Properties of the Transition Point of Tensile Curves, and Its Influence on the Aging of Aluminum-Base Alloys.** B. Jaoul, F. Aubertin, and C. Crussard. *Revue de Métallurgie*, v. 49, Sept. 1952, p. 633-644; disc., p. 644-646.

Micrographic and X-ray studies were made. The influence of electric properties of Al-Mg and Al-Cu alloys. Charts and micrographs. (Q27, P15, N7, Al)

1036-Q. (German.) **Compressibility of Cast Zinc as a Function of the Angle of Compressing Direction to Direction of Crystal Growth.** Rolf Denker, Günter Falkenhagen, and Wilhelm Hofmann. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, v. 4, 1952, p. 87-93.

Compressibility was measured under the drop hammer at temperatures between 20 and 400° C. When perpendicularly compressed this material offers a resistance against deformation several times higher than when compressed parallel or inclined by 45° to the plane of the plate. Diagrams, photographs, and graphs. (Q28, Zn)

1037-Q. (German.) **Elastic-Plate Stress Research by Means of Photoelasticity.** R. Kuhn. *Forschung auf dem Gebiete des Ingenieurwesens*, ser. B, v. 18, no. 3, 1952, p. 72-80.

Recent developments, particularly analysis of 3-dimensional stresses by the freezing method. 13 ref. (Q25)

1038-Q. (German.) **The Problem of Design Strength in Malleable Cast Iron.** E. Mickel. *Giesserei*, v. 39, Sept. 4, 1952, p. 429-431.

Experiments were carried out on a series of simple structural elements in order to establish dynamic design strength. Experimental conditions, methods, and results. Tables, charts, and diagrams. (Q23, CI)

1039-Q. (German.) **The Significance of Submicroscopic Inclusions in the Development of High-Strength Steels for Large Steel Structures.** Nehl Franz. *Stahl und Eisen*, v. 72, Oct. 9, 1952, p. 1261-1267.

Effects of inclusions on tensile and yield strength of weldable Mn, Mn-Cu, Mn-Cu-Ni steels and in Cu-Ni steels containing 0.2-0.3% Mo or V and less than 0.03% (Ta + Cb) or Ti. (Q23, CN, AY)

1040-Q. (German.) **Effect of Aluminum on the Properties of Low-Carbon Steels.** Kurt Born and Walter Koch. *Stahl und Eisen*, v. 72, Oct. 9, 1952, p. 1268-1277.

Effects of small Al additions on strength properties of low-carbon steels, methods of analyzing oxide inclusions and nitrides, and electron-microscope examination. Photomicrographs and charts. (Q23, M21, CN)

1041-Q. (German.) **Frequency Curves for the Yield Point of Structural Steel St 37.** Günter Markiefka. *Stahl und Eisen*, v. 72, Oct. 9, 1952, p. 1302-1303.

A statistical analysis of 4232 yield point determinations on a structural steel. (Q23, CN)

1042-Q. (German.) **Basic Problems of Wear.** Wilhelm Späth. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Sept. 1, 1952, p. 829-832.

On the basis of the literature, and various examples of wear, a general method is proposed for its calculation. Graphs. 13 ref. (Q9)

1043-Q. (German.) **Endurance Tests and Behavior of Materials Under Vibration Stress. I. Endurance Tests as a Basis for Calculations.** M. Hempel. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Sept. 1, 1952, p. 809-815.

Details of tests on carbon, low-alloy, and stainless steels. Tables and graphs. 40 ref. (Q7, ST)

1044-Q. (German.) **Influence of Surface Roughness on the Alternating Bending Strength of Unhardened and Heat Treated Steel.** G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Sept. 1, 1952, p. 855-857.

Experimental details of a series of tests. Data are tabulated and compared with results quoted in the literature. (Q5, ST)

1045-Q. (German.) **Criteria of Incipient Slip in Polycrystalline Metals.** F. Rohner. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Sept. 15, 1952, p. 383-390.

It is shown that slip is possible without bonds being disrupted or energy being spent against bonding forces. Determinations of the elastic limit of wrought and sintered pure Al are in accordance with this theory. (Q24)

1046-Q. (German.) **Tensile Deformation of Monocrystals Using a Rotating Grip.** Jörg Diehl and Albert Kochendörfer. *Zeitschrift für angewandte Physik*, v. 4, July 1952, p. 241-247.

A new tensile-testing machine with self-aligning grips which makes it possible to determine tensile and shear stresses in one operation. Typical results tabulated, charted, and discussed. 12 ref. (Q27)

1047-Q. (German.) **On the Properties of Metallic Melts. V. The Internal Friction of Liquid Copper-Tin Alloys.** *Zeitschrift für Metallkunde*, v. 43, Aug. 1952, p. 292-296.

Dependence of melt properties upon temperature and concentration. Results are tabulated and interpreted. (Q22, Cu, Sn)

1048-Q. Internal Stress in Castings. *Foundry Trade Journal*, v. 93, Oct. 23, 1952, p. 471-477.

Subcommittee report discusses some possible origins of internal stresses and presents experimental data on double-flanged bars, triangular grid castings, and hollow cylinders. Materials were Al alloys and cast steels. Graphs. (Q25, CI, Al)

1049-Q. Alloy Tool Steels With Nitrogen. *Iron Age*, v. 170, Nov. 6, 1952, p. 163-165. (Translated by S. L. Case from a Russian book published by the Central Scientific Research Institute of Technology and Machine Construction, Moscow.)

Use of N as an alloying element in special steels has practically doubled tool life under certain conditions Russian metallurgists claim in a series of papers. Nitrogen, which must be used with Al for best results, is reported to increase stability of austenite in the annealed, quenched, and in cold worked, high-Cr, high Ni steels. Additions of 0.15-0.25% N replaces 4-5% Ni in the manufacture of austenitic steels. In austenitic high-C steels, N is generally found in carbide phase. Results of tool-life tests using toolsteels of various compositions from 36 experimental melts are tabulated. Effects of repeated tempering on hardness stability of two low-alloy steels are charted. (Q general, Q29, Q9, AY, TS)

1050-Q. Improved Ferritic Steel Can Replace Austenitic Steel. Joe Gin-Young Chow and D. W. Kaufman. *Iron Age*, v. 170, Nov. 6, 1952, p. 166-169.

A ferritic steel containing approximately 13% Cr has proved suitable for service somewhat above 1000° F., and is not weakened by sharp notches at 1000, 1100, and 1200° F. High ductility is maintained at elevated and room temperatures after long periods of exposure. Mechanical properties are tabulated and charted. Information on annealing and carbide precipitation. (Q general, J23, N7, SS, SG-h)

1051-Q. Residual Stresses in Aluminium Alloy Sand Castings. R. A. Dodd. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 77-81.

Study made on extent to which residual stresses in Al-alloy sand castings are determined by a number of variables. Results show that stress increases almost linearly with increase in percentage of water in molding sand; stress increases rapidly with increase in stripping time up to about 10 min., beyond which time, rate diminishes considerably, maximum stress being attained in 1 hr.; very slight increase in stress is observed with increase in pouring temperature; and mold strength exerts no effect on stress magnitude. Diagrams. 11 ref. (Q25, Al)

1052-Q. The Creep-Time Relationship Under Constant and Tensile Stress. S. Bhattacharya, W. K. A. Congreve, and F. C. Thompson. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 83-92.

Research carried out at constant stress on Cu, Zn, Sn, Cd, Pb, Al and Pb-Sn eutectic. All results are consistent with equation: $\sigma_t = \sigma_o + at^k$, where σ_t and σ_o are, respectively, total and initial strain, t is time, and a and k are constants. Graphs. 21 ref. (Q3, Cu, Zn, Sn, Cd, Pb, Al)

1053-Q. The Temperature Dependence of Transient and Secondary Creep of an Aluminium Alloy to British Standard 2L42 at Temperatures Between 20° and 250° C. and at Constant Stress. A. E. Johnson and N. E. Frost. *Journal of the Institute of Metals*, v. 81, Oct. 1952, p. 93-107.

A study by means of creep tests in pure torsion on thin-walled tubular specimens at a constant stress of 2 tons per sq. in., and at 50° C. intervals over the range of 20-250° C.

It is concluded that for this alloy no current fundamental theory adequately describes transient creep in above range although up to 200° C. secondary creep rates agree quite well with theories based on the Eyring rate process theory. Total forward creep is well represented at all temperatures by a derived equation. Tables and graphs. 13 ref. (Q3, Al)

1054-Q. Small Additions Raise Strength of Zirconium at Elevated Temperatures. A. D. Schwope and W. Chubb. *Journal of Metals*, v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 1138-1140.

Effects of small amounts of a number of elements upon strength of Zr were studied. It was found that Mo and possibly Cb are most effective in strengthening Zr at temperatures below 500° C., but that Al, Ta, and V are most effective above 600° C. Graphs. (Q23, Zr)

1055-Q. Ductile Iron Combines Properties of Cast Iron, Malleable Iron, Steel. *Journal of Metals*, v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 1143-1145.

Properties include mechanical wear resistance, equaling that of gray iron; resistance to heat and oxidation at elevated temperatures superior to gray iron; fatigue resistance and ability to sustain shock loads the same as ordinary steel having same yield strength; and arc weldability with techniques established for gray iron. Photographs and tables. (Q general, K1, CI)

1056-Q. Effect of Austenitic Grain Size on Nickel-Chromium Steels. A. B. Chatterjea and B. R. Nijhawan. *Journal of Scientific & Industrial Research*, v. 11B, Sept. 1952, p. 388-391.

Effect of Al additions on mechanical properties, grain growth, and thermal critical ranges of two Ni-Cr steels made from the same cast. Micrographs and graphs. 13 ref. (Q general, N3, AY)

1057-Q. Bigger Tool Steel Bars: The Inside Story. David P. Hughes. *Steel*, v. 131, Nov. 3, 1952, p. 96-97.

Up to now, high speed steel bars on forgings have been made to a maximum weight of only 500-800 lb. Latrobe Steel Co. has now produced bars as large as 10 in. diameter, 10 ft. long, and weighing over 2500 lb. They are internally sound and free of carbide segregation. Causes and control of segregation, and results of comparative impact tests. (Q general, Q6, M28, TS)

1058-Q. A Method for the Determination of Stresses Produced on Electro-Deposition by Using Electrical Strain Gauges. E. G. Ramachandran and K. V. Chinnappa. *Transactions of the Indian Institute of Metals*, v. 4, 1950, p. 173-181.

Use of bonded wire strain gages for accurate and rapid measurements of surface stresses set up in a metallic strip during plating. A theory relating strain produced in a metallic strip with thickness of plating was also developed and applied to evaluate stresses due to plating of Ni on steel. Diagrams and photographs. 11 ref. (Q25, L17, ST, Ni)

1059-Q. (English.) **The Effect of Notches on the Strength of Aluminium Alloys Under Static Tensile Loading.** J. H. Palm. *Metalen*, v. 7, Sept. 30, 1952, p. 309-316.

Notched, cylindrical tensile specimens of 24S-T and 51S-W were used in the study. Length, size, notch angle, and depth were varied. Data are charted. 12 ref. (Q27, Al)

1060-Q. (German.) **Relationships Between Aging, Notch-Impact Resistance, and Chemical Composition of Unkilled Steels.** Heinz Kornfeld. *Archiv für das Eisenhuttenwesen*, v. 23, Sept.-Oct. 1952, p. 345-350; disc., p. 350-352.

Critical evaluation of the aging behavior of 77 different cold worked steels. Correlations between average notch impact strength of aged steels and their chemical compositions, notch diameters, and degree of cold working are formulated. Tables and graphs. (Q6, N7, CN)

1061-Q. (German.) **X-Ray and Mechanical Measurements of Deformation of Gray Iron.** Viktor Hauk. *Archiv für das Eisenhuttenwesen*, v. 23, Sept.-Oct. 1952, p. 353-361.

Results of a comparative study of mechanical and X-ray measurements of deformations and stresses in gray iron subjected to tension, compression, and bending stresses. Results point to important concepts on the mechanism of gray-iron deformation. Tables, diagrams, photomicrographs, and graphs. 39 ref. (Q23, CI)

1062-Q. (German.) **Appearance of Cracks in Bent Tubes.** Wolfgang Mielentz. *Brennstoff-Wärme-Kraft*, v. 4, Oct. 1952, p. 345-348.

Alternating stresses and increased electrochemical corrosion are the two primary causes of cracking of bent boiler and steam pipes. Photographs, photomicrographs, and diagrams. (Q25, R1, AY)

1063-Q. (German.) **Notch-Impact Toughness of Light-Metal Welds.** A. Matting and A. Müller-Busse. *Metall*, v. 6, Oct. 1952, p. 586-589.

Highly pure Al, Al-Mg, and Al-Mg-Mn alloys were used to study the effect of type of notch, temperature, and previous treatment. Graphs, tables, photographs, and photomicrographs. (Q6, K9, Al)

1064-Q. (German.) **Malleable Aluminum Alloys and Their High-Temperature Creep-Stress Resistance.** R. Irmann. *Metall*, v. 6, Oct. 1952, p. 608-612.

Research results on the creep strength and fatigue strength of Al-Cu-Mg and Al-Cu-Ni alloys from room temperature to 500° C. Graphs and tabulated data. 11 ref. (Q3, Al)

1065-Q. (German.) **Indentation Hardness—Its Dependence on Load and a Suggestion for a New Definition.** P. Grodzinski. *Schweizer Archiv für angewandte Wissenchaft und Technik*, v. 18, Sept. 1952, p. 282-292.

Discusses critically the older definition of micro-indentation hardness and demonstrates validity of new definition stated as follows: Hardness is the test load, in kg. or g., which effects an indentation of unit size, e.g., 1 mm. Diagrams, tables, and graphs. 29 ref. (Q29)

1066-Q. (German.) **X-Ray Stress Measurements for Investigation of Increased Yield Point in Bending of Steel.** Richard Glocker and Eckard Macherauch. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 313-316.

Experiments disprove the idea that yield point in bending is higher than the yield point in tension. Procedure of testing; data are graphed and tabulated. (Q5, Q25, ST)

1067-Q. (German.) **Flow Lines in Aluminum Monocrystals in the Range of Small Plastic Deformations.** Peter Haasen and Günther Leibfried. *Zeitschrift für Metallkunde*, v. 43, Sept. 1952, p. 317-321.

Experimental and theoretical study on monocrystalline Al wires with up to 2% elongation. Parabolic and logarithmic flow laws and peculiarities in the flow curves. Graphs. 11 ref. (Q24, Al)

1068-Q. Fatigue; Its Nature and Some Ways of Reducing Its Incidence. P. L. Litherland Teed. *Aircraft Production*, v. 14, Nov. 1952, p. 362-365.

Engineering aspects of fatigue plus tabulated data on tensile stress, fatigue limit, and fatigue resistance of carbon steels and Al alloys. Heat treatment effects for Al alloys. 15 ref. (Q7, Al, CN)

1069-Q. Fatigue Machines for Low Temperatures and for Miniature Specimens. W. N. Findley, P. G. Jones, W. I. Mitchell, and R. L. Sutherland. *ASTM Bulletin*, Sept. 1952, p. 53-55.

Design and features of following new types of fatigue testing apparatus: high-speed rotating-beam fatigue machine designed for operation at temperatures as low as −320° F.; repeated-bending fatigue machine for tests at temperatures as low as −320 ° F., equipped for tests in bending, torsion, or combined bending and torsion; and repeated-bending fatigue machine equipped with suitable fixtures to permit tests on miniature specimens ¾ in. long in either bending or torsion. Diagrams and photographs. (Q7)

1070-Q. Surface Effects in the Slip and Twinning of Metal Monocrystals. John J. Gilman and T. A. Read. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 875-883.

Experiments described pertain to (*a*) effect of a crystal's shape on its plastic deformation, and (*b*) effect of metallic surface films on plastic deformation. For work pertaining to (*a*), crystals of Zn, Sn, and Pb were grown in various shapes. These were tested in simple tension. Macroscopic rotations about tension axis which are unpredicted by classical theory of slip were observed, and serrated edges were observed in Sn crystals. For work pertaining to (*b*), effects of evaporated and electrodeposited films of Cu, Ni, Au, and Zn on mechanical properties of Zn, Sn, and Pb crystals were determined. Films influenced both slip and twinning of crystals in creep and tensile tests. Diagrams, tables, and macrographs. 29 ref. (Q24, Zn, Sn, Pb)

1071-Q. An Engineering Method for Estimating Notch-Size Effect in Fatigue Tests on Steel. Paul Kuhn and Herbert F. Hardrath. *National Advisory Committee for Aeronautics*, Technical Note 2805, Oct. 1952, 35 pages.

An evaluation of the Neuber constant was made for a large number of fatigue tests on steel specimens for stresses near the endurance limit. Conclusion was drawn that the fatigue factor K_f at the endurance limit can be estimated for steels with reasonable accuracy by using Neuber's formula, in conjunction with the Neuber constant A. Graphs and tables. 22 ref. (Q7, ST)

1072-Q. Effects of Cyclic Loading on Mechanical Behavior of 24S-T4 and 75S-T6 Aluminum Alloys and SAE 4130 Steel. C. W. MacGregor and N. Grossman. *National Advisory Committee for Aeronautics*, Technical Note 2812, Oct. 1952, 53 pages.

SAE 4130 steel and 24S-T4 and 75S-T6 Al alloys were subjected to cyclic loading followed by various mechanical tests to determine effect of prior cycles on the transition temperature to brittle fracture for SAE 4130 steel and on energy-absorption capacity of the Al alloys; studies were made to detect the origin of failure; and auxiliary tests such as Charpy impact tests, microhardness surveys, tension tests, and fretting-corrosion studies were conducted. Tables, graphs, micrographs, and photographs. (Q general, R1, Al, AY)

1073-Q. Torsion Tests of Aluminum-Alloy Stiffened Circular Cylinders. J. W. Clark and R. L. Moore. *National Advisory Committee for Aeronautics*,

Technical Note 2821, Nov. 1952, 38 pages.

Series of tests on Al alloy 24S-T3. Wall thickness of the cylinders was 0.032 in. An empirical equation is presented showing the relation between average compressive stresses in the longitudinal stiffeners and torques in the tension-field range. Some analysis of longitudinal-stiffener failures is also included. Tables, diagrams, graphs, and photographs. (Q1, Al)

1074-Q. Metallurgists Probe Causes of Stress Failure in Big-Inch Gas-Transmission Pipe. J. W. Lodge and G. K. Manning. *Oil and Gas Journal*, v. 51, Nov. 17, 1952, p. 344-346, 348-350.

Battelle Memorial Institute research in which it was found that small flat spots and dents cause large local bending stresses on application of internal pressure and that proof-testing pressure should be 150 psi. higher than maximum operating pressure. (Q5, S21, CN)

1075-Q. Yield Points in Bending Experiments on Zinc Crystals. M. J. Dumbleton and B. W. Howlett. *Proceedings of the Physical Society*, v. 65, sec. B. Nov. 1, 1952, p. 882-886.

Yield points can be observed in unstrained Zn crystals by means of a bend test when this is arranged so that premature overstraining of specimen due to stress concentrations from grips, non-axial loading, and handling, are avoided. Concludes that previous plastic deformation is not essential to appearance of a sharp yield in Zn crystals, and that failure to observe initial sharp yielding in tensile tests is due to limitations of experimental technique. (Q23, Zn)

1076-Q. Some Observations on the Yield Point in Zinc. H. L. Wain. *Proceedings of the Physical Society*, v. 65, sec. B, Nov. 1, 1952, p. 886-896.

Evidence confirming the fact that yield point of Zn is due to N_2 in solution. Theoretical prediction that a yield point should appear in a susceptible crystal without prior deformation is verified experimentally, and an explanation is given of the appearance of yield point in a specimen even though free dislocations have been introduced subsequent to aging. Graphs. 17 ref. (Q23, Zn)

1077-Q. Deformation and Fractures Produced by Intense Stress Pulses in Steel. W. M. Evans. *Research*, v. 5, Nov. 11, 1952, p. 502-509.

High-explosive charges were used in the investigation. Characteristic fractures are illustrated. (Q26, CN)

1078-Q. New Alloy Tough in the Hot Spots. *Steel*, v. 131, Nov. 1952, p. 90-91.

Ni alloy NA22H is heat resistant at unusually high temperatures. Composition is approximately 0.5% C, 26% Cr, 46% Ni, 1.4% Mn, 1.0% Si, and 53% W. Tensile and creep strength, oxidation resistance at 2200° F., thermal expansion, weldability, and applications. (Q27, Q3, P11, K9, T general, Ni)

1079-Q. Temper Brittleness in Low-Alloy Steel Weld Metal. Richard P. Wentworth and Hallock C. Campbell. *Welding Journal*, v. 31, Nov. 1952, p. 505s-514s.

Investigated in five low-hydrogen, low-alloy weld-metal compositions. A slow notch-bend test was developed to indicate relative ductility or brittleness. By use of fracture appearance and percent contraction in width of specimen beneath notch, isothermal development of temper brittleness could be studied. (Q23, K9, AY)

1080-Q. Brittle Strength and Transition Temperature of Structural Steel. W. C. Hoeltje and N. M. Newmark. *Welding Journal*, v. 31, Nov. 1952, p. 515s-521s.

A study and interpretation of test data from wide plate tests sponsored by the Ship Structure Committee. Graphs. 14 ref. (Q23, CN)

1081-Q. Embrittlement of High-Strength Ferritic Welds. Peter P. Puzak and William S. Pellini. *Welding Journal*, v. 31, Nov. 1952, p. 521s-526s.

Investigation of the effect of thermal stress relief of high-strength ferritic welds of the Mn-Mo and Ni-Mo-V types. Graphs, tables, and photographs. (Q23, J1, AY)

1082-Q. Studies of the Crack Sensitivity of Aircraft Steels. A. W. Steinberger and J. Stoop. *Welding Journal*, v. 31, Nov. 1952, p. 527s-542s.

Investigation includes hydrogen theory; transformation cracking; cold cracking due to H diffusion into cavities of steel and transforming to molecular H_2; H_2 embrittlement; method of introducing H_2 into Al, Mg, Fe, steel, Mn, and Ni; H_2 occlusion in Al, methods of examination; postheat observations of cracking due to steam; effect of stress direction upon microcracking; and micro-cracking in mild steels. Micrographs and macrographs. (Q23, N1, CN)

1083-Q. Thermal Fatigue and Thermal Shock. Helmut Thielsch. *Welding Research Council*, Bulletin Series 10, Apr. 1952, 24 pages.

Review of published and unpublished information on characteristics of thermal fatigue and shock; effects of stresses, design, structure, carbon migration, intergranular oxidation, phase transformations, welding, etc. Describes testing procedures and occurrence of thermal fatigue and shock in various applications. Tables, graphs, and micrographs. 59 ref. (Q7, ST, SG-h)

1084-Q. Quantitative X-Ray Diffraction Observations on Strained Metal Aggregates. G. B. Greenough. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York, 1952, p. 176-219.)

Observations made on aggregates when bulk macroscopic measurements indicate that they are elastically strained; and on plastically strained aggregates. Work was carried out on iron and mild steel at room temperature. Graphs and diagrams. 114 ref. (Q21, Q23, M22, Fe, CN)

1085-Q. (French.) **Effects of the Presence of Phosphorus on Spheroidal-Graphite Cast Irons.** Maurice Grandpierre and Henry de Bouvier. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 689-698; disc., p. 698.

Effects of P on microstructure, tensile strength, elastic limit, ductility, Brinell hardness, and Young's modulus were studied. Test data are charted. Micrographs. (Q general, M27, CI)

1086-Q. (French.) **New Micro-Motion-Picture Photographic Investigations of the Deformation and Fracture of Steel.** G. A. Homes and J. Gouzou. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 707-718; disc., p. 719.

Deformation and fracture by tension, bending, and notched-bar impact were studied. Micrographs and charts. 27 ref. (Q24, Q26, CN)

1087-Q. (German.) **The Friction Factor of Aluminum in Contact With Some Other Metals.** H. Kostron and F. Schlaberg. *Aluminium*, v. 28, Oct. 1952, p. 341-346.

The interdependence of friction factors for different material pairs. Data are charted and tabulated for various ferrous and nonferrous alloys in contact with Al. (Q9, Al)

1088-Q. (Italian.) **Relationship Between the Results of Creep Tests and Fatigue Tests At High Temperature for Some Types of Steel.** Andreini and A. Erra. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 299-307.

Results of experiments on a low-alloy Cr-Mo and an 18-8 stainless steel. Factors influencing fatigue resistance of steel. Data are tabulated and charted. Micrographs. (Q3, Q7, AY, SS)

1089-Q. (Italian.) **Principles for the Study of the Technological Process of Plastic Deformation.** Guiseppe Carro-Cao. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 347-353.

Principles for homogeneous and isotropic metallic substances in which the plastic deformation starts when the stress reaches a critical value. (Q24)

1090-Q. (Italian.) **Resilience Tests for High-Carbon Steels.** Davide Giaccone. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 399-421.

Impact tests, ordinarily used for mild and semihard steels, were applied to hypereutectoid steels in the hardened state. Experimental data are tabulated. (Q6, CN, AY)

1091-Q. (Italian.) **Experimental Wear and Porosity Tests of the Chromium Deposit on the Liners of Diesel-Ansaldo Motors.** Giorgio Rappini, Carlo Castello, and Giona Prencipe. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 459-469.

Series of experiments designed to establish the relationship between porosity and wear resistance. Results are tabulated and interpreted. Micrographs. (Q9, L17, Cr)

1092-Q. (Pamphlet.) **The Effect of Decarburization and Other Factors on the Fatigue Strength of Roll-Threaded Aircraft Bolts.** I. Weibull-Saab. Aircraft Co. (Linkioping, Sweden), TN-4, July 1, 1952, 19 pages.

Main operations in manufacturing roll-threaded aircraft bolts of low-alloy Cr-Mo steel. Fatigue strength of the bolts was seriously affected by certain types of laps but only slightly by decarburization. Threading after heat treating increased the fatigue limit considerably and Cd plating had a very slight effect. Tables and micrographs. (Q7, G12, AY)

1093-Q. (Book.) **Strength of Materials.** Frank J. McCormick. 177 pages. 1952. Macmillan Co., 60 Fifth Ave., New York 11, N. Y.

Presented in a way that reader may gain a more than superficial understanding of subject matter even though his mathematical preparation does not extend beyond trigonometry. Includes stress and strain, welded and riveted joints of tanks, torsion, stresses in beams, beam deflections, statically indeterminate beams, combined loading, and columns. (Q23)

1094-Q. (Book.) **Etudes des Perturbations Cristallines, Produites dans les Métaux par des Efforts Alternés.** (Studies of Structural Deformations Produced in Metals by Alternating Stresses.) Paul Laurent. 116 pages. 1952. Service de Documentation et d'Information Technique de l'Aéronautique, 2 Avenue de la Porte-d'Issay, Paris 15, France. 1000 Fr.

A hybrid between a thesis and a research paper. Author has carried out a long series of experiments dealing mostly with metallographic changes accompanying fatigue of Al and Fe, both in torsion and in bending. He used an unorthodox testing machine, in which stress is a dependent variable determined by dimensions of the flat specimen and amplitude of strain. (From review in *Metallurgical Abstracts*). (Q7, Al, Fe)

R

CORROSION

514-R. Engine Lubricating Oils; the Performance of Premium and Heavy-Duty Qualities. J. G. Withers. *Automobile Engineer,* v. 42, Oct. 1952, p. 387-393.

Basic functions and various types of oils. Includes engine wear and corrosion of bearing alloys. 10 ref. (R7, Q9, SG-c)

515-R. Corrosion of Metals. An Historical Treatment of the Subject. U. R. Evans. *Chemistry & Industry,* Oct. 11, 1952, p. 986-993.

Corrosion of nonferrous metals and iron in early times, early views of electrochemical mechanisms, corrosion of two metals in contact and of single metals, measurement of corrosion currents, corrosion probability and rate oxidation, tarnishing, atmospheric corrosion, corrosion fatigue, stress corrosion, inhibitive water treatment, cathodic protection, and protective coatings. 11 ref. (R general, L general, A2)

516-R. Studies in the Corrosion of Metals Occasioned by Aqueous Solutions of Some Surface-Active Agents. II. Mild Steel. T. K. Ross and H. Holness. **III. Tin.** T. K. Ross. *Journal of Applied Chemistry,* v. 2, Sept. 1952, p. 520-531.

Action of dilute aqueous solutions of representative anionic, cationic, and nonionic wetting agents on mild steel sheet and sheet tin. Results expressed graphically. 11 ref. (R5, P10, CN, Sn)

517-R. The Stress-Corrosion Cracking of Mild Steels in Nitrate Solution. R. N. Parkins. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 149-162.

Reason for formation of intergranular macro-cracks in mild steels subject to static stress and corrosive environment of a boiling Ca-ammonium nitrate solution. Significance of the work is the relationship between carbide distribution in material and its tendency to this type of failure. A further relationship is indicated between lattice distortion of grains and a tendency to stress-corrode. Results indicate that susceptible mild steels have an almost continuous film of distorted ferrite in the grain-boundary region. Suggests theory that this distortion is sufficient to make boundary regions anodic to rest of the grain. Graphs, photomicrographs, and tables. 31 ref. (R1, CN)

518-R. Corrosion of Alkaline Pulping Digesters: Analysis of Corrosion Questionnaires. R. S. Peoples and G. L. Ericson. *Tappi,* v. 35, Sept. 1952, p. 403-409.

Tabulates results of extensive questionnaire sent to kraft and soda pulp mills in the U. S., Canada, and Australia. Additional work and tests are suggested. (R5, ST)

519-R. Surface Corrosion of Heat-Resisting Materials Under the Action of Bunker Oil Ashes Containing Sodium, Sulphur and Vanadium. F. Gallmann, J. Friedli, and W. Epprecht. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 32-43; disc., p. 43-49.

A study at 650° C. to determine also whether internal structural changes occur. Four commercial heat resisting alloys were used, one Ni-base and the rest stainless steels. Microscopic and X-ray data. Information on recrystallization. Photomicrographs, X-ray photographs, and tables. (R7, M27, N5, SS, Ni, SG-h)

520-R. (French.) **Anticorrosive Protection of Underground Pipe and Surveying the Terrain.** A. J. Maurin. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 50-70; disc., p. 76-78.

A special technique based on study of some 5000 km. of all types of pipelines and installation of cathodic protection on about 1000 km. Includes data for steel, iron, and Pb. Circuit and other diagrams, and elaborate reference and calculation charts. 10 ref. (R10, ST, Pb)

521-R. Mitigation of Corrosion Within Carbon Compartment Aboard a T-2 Tanker. G. D. Harden. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 79-85; disc., p. 95-96.

Application and results of anticorrosion system for tankers in refined petroleum service. It consists of galvanic protection plus chemical inhibition. (R7, R10, ST)

522-R. Rust-Inhibited Distillate Fuels. F. M. Watkins. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 86-95; disc., p. 95-96.

Properties and performance of a commercial rust inhibitor developed to prevent internal corrosion in industrial equipment, automobile parts, etc., which are in contact with distillate fuels. (R7, R10)

523-R. (French.) **Safety and Economy in the Protection of Subterranean Steel Pipelines.** O. L. Bihet and H. Goldstein. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 71-76; disc., p. 76-78.

Protective system extensively used in Western Europe consists of a modified bitumen coating in conjunction with cathodic protection. Tables. (R10, L26, ST)

524-R. The Corrosion Problem in Sewage and Waste Treatment. John J. Baffa. *Water & Sewage Works,* v. 99, Oct. 1952, p. 399-401.

Corrosive influences, bacteria and corrosion, and hot-water corrosion. (R4)

525-R. Sewage Corrosion Control at New York City Treatment Plants. Richard C. French. *Water & Sewage Works,* v. 99, Oct. 1952, p. 402-406.

Painting and replacing parts with newer alloys are suggested for controlling corrosion. (R4, ST)

526-R. Corrosion of Structural Spot Welds. B. Karnisky, E. Kinelski, and E. Gruca. *Welding Journal,* v. 31, Oct. 1952, p. 903-916.

Investigation of corrosion phenomena in spot welded joints in low-alloy, high-strength steel plus an evaluation of beneficial effects of protective weld sealers. Results are tabulated; macrographs and micrographs. (R general, K3, AY)

527-R. (French.) **Research on the Mechanism of Oxidation of Iron Monocrystals.** Jean Bardolle and Jacques Benard. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 613-621; disc., p. 621-622.

Experimental investigations on the above under various oxygen pressures and at different temperatures. Preparation of test specimens and results. Micrographs. 15 ref. (R2, Fe)

528-R. (French.) **Passivity of Stainless Steels in an Acid Medium.** J. M. Defranoux. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 664-672.

The rate of corrosion and special types of corrosion corresponding to a very high metal-solution potential were investigated. Progressive establishment of passivity of stainless steels in a strong-acid medium, and the mechanism of the process. Diagrams. 13 ref. (R10, SS)

529-R. (Russian.) **Inhibition of Corrosion of Nitrided Steel in Sulfuric Acid.** S. A. Balezin and V. B. Ratinov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 367-368.

The kinetics of the solution of nitrided layers and the inhibition of corrosion. Data are tabulated and charted. (R10, ST)

530-R. (Russian.) **The Structure of Copper Scale and the Mechanism of the Oxidation of Copper.** N. P. Diev and M. I. Kochnev. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 21, 1951, p. 563-566.

An experimental study. 11 ref. (R2, Cu)

531-R. Reducing Return Line Corrosion by New Makeup Treatment. F. N. Kemmer and N. C. Stratton. *Heating and Ventilating,* v. 49, Nov. 1952, p. 105-107.

Theory of process involving reduction of make-up alkalinity through anion exchange. An example of pratical application of method. (R10)

532-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Nov. 1952, p. 101A-102A, 104A.

Summarizes in chart form corrosion of 18-8S steel by HNO_3 as a function of temperature. (R5, SS)

533-R. Effect of Corrosion and Growth on the Life of Positive Grids in the Lead-Acid Cell. J. J. Lander. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 467-473.

Corrosion and growth of several binary and ternary Pb alloys were measured under various conditions. It was found that Sn additions have a positive effect in slowing corrosion rates and that small amounts of a third element may be added to increase tensile strength without increasing corrosion rates. An empirical relationship between growth and tensile strength is shown. Tables and graphs. (R5, Q27, Pb)

534-R. The Passivity of Metals. Part XI. The Anodic Behaviour of Iron Oxide Films. U. R. Evans and I. D. G. Berwick. *Journal of the Chemical Society,* Sept. 1952, p. 3432-3437.

Study made of behavior of iron, coated with a visible oxide film by previous heating in air, when subjected to anodic treatment in dilute H_2SO_4. Measurements were made of time needed for destruction of oxide film by auto-reduction after interruption of current. Diagrams and graphs. (R10, Fe)

535-R. (German.) **Borderline Cases of Corrosion of Stainless Steels.** Luigi Piatti. *Werkstoffe und Korrosion,* v. 3, Sept.-Oct. 1952, p. 325-328.

Corrosion experiments destined to determine suitability of materials for use in the chemical industry. Results of tests are interpreted. Micrographs. (R11, T29, SS)

536-R. A Metallographic Study of Pitting Corrosion Induced in 2S Aluminum Alloy by Exposure to Tap Water. E. C. Pearson, H. J. Huff, and R. H. Hay. *Canadian Journal of Technology,* v. 30, Oct.-Nov. 1952, p. 311-316.

Samples of above alloy, in both the fully work hardened and annealed states, were examined under the conventional light microscope and electron microscope after exposure to pitting corrosion conditions in tap water for periods of 15 min., 24 hr., and 10 weeks. Prior to exposure all sample panels received a uniform pretreatment designed to bring the panel surfaces into the same initial condition. Typical photomicrographs show variation observed in pit structure with time of exposure and with metallurgical condition. 17 ref. (R11, Al)

537-R. Corrosion Due to Tuberculation in Water Systems. I. The Effect of Calgon on the Potential of Iron Electrodes in Differential Aeration Cells With Running Tap Water. II. The Effect of Calgon on the Potential of Zinc and Copper Electrodes in Differential Aeration Cells With Running Tap Water. J. L. Mansa and Waclaw

Szygalski. *Corrosion* (Technical Section), v. 8, Nov. 1952, p. 381-390.

Graphs and diagrams. 30 ref. (R4, P15, Fe, Zn, Cu)

538-R. Potential and Current Requirements for the Cathodic Protection of Steel in Soils. W. J. Schwerdtfeger and O. N. McDorman. *Corrosion* (Technical Section), v. 8, Nov. 1952, p. 391-398; disc., p. 398-399.

Potentials of steel in 20 airfree soils varying in pH from 2.9 to 9.6 were determined in the laboratory. These data and potential-pH relation for hydrogen electrode were used in fixing optimum potential for cathodic protection of steel against corrosion. Cathodic polarization curves are interpreted in terms of above potential and current requirements for cathodic protection of steel in soils. Tables, graphs, diagrams, and photographs. 15 ref. (R10, ST)

539-R. Converting to Non-Nickel Stainless Steel. Parts I and II. Richard E. Paret. *Electrical Manufacturing*, v. 50, Oct. 1952, p. 112-115, 342, 344, 346; Nov. 1952, p. 137-141, 330, 332, 334.

Part I: Comparative data on corrosion resistance and mechanical properties of Cr stainless steel. Part II: Design problems faced in changing from 18-8 stainless to the more readily available Type 430 which arise from differences in fabricating characteristics. Tables. (To be concluded.) (R general, Q general, SS)

540-R. Pump Materials That Can Reduce Corrosion. R. J. MacMeekin. *Industry and Power*, v. 63, Nov. 1952, p. 97-98.

Characteristics of various metals, and combinations applicable for special conditions met in actual operation. Table. (R4, SG-g)

541-R. The Cause of the Chemical Resistance of Stainless Steel. I. D. G. Berwick and U. R. Evans. *Journal of Applied Chemistry*, v. 2, Oct. 1952, p. 576-590.

Influence of anodic and cathodic treatment; corrosion rates and potentials in aerated and de-aerated acid; times of activation on replacing oxygen by inert gas; times of passivation on replacing inert gas by oxygen; and effect of connection with an external aerated cathode. Tables, graphs, and diagrams. 30 ref. (R10, SS)

542-R. Scaling of Lead in Air. Elmer Weber and W. M. Baldwin, Jr. *Journal of Metals*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, 854-859.

Solid Pb obeys a single parabolic weight increase vs. time law. In contrast, liquid Pb undergoes three successive parabolic weight increase vs. time laws, first of which has a law constant relative to latter two. Conversion times for change from one parabola to the next decrease with increasing temperature. Graphs. 18 ref. (R2, Pb)

543-R. Role of Corrosion in Engine Wear. J. C. Geniesse and H. R. Jackson. *Petroleum Processing*, v. 7, Nov. 1952, p. 1620-1622.

Reviews work of various investigators to show influence of low-temperature operating conditions and sulfur content of fuels on wear of cylinder walls and piston rings. Jacket temperature, oil, cylinder-wall metallurgy, and fuels are considered. Graphs. (R7, Q9)

544-R. Dow Conquers Sea Water Corrosion. D. P. Thornton, Jr. *Petroleum Processing*, v. 7, Nov. 1952, p. 1640-1643.

Dow Chemical Co., uses water from Gulf of Mexico as a coolant and process raw material. Alloys used for various locations, corrosion-preventive coatings, and cathodic protection measures. (R4)

545-R. Galvanic Corrosion of Dissimilar Metals. Part I. W. D. Mogerman. *Sheet Metal Worker*, v. 44, Nov 1952, p. 41-43, 104.

Various examples encountered by the author and by others. Reviews principles. (To be continued.) (R1)

546-R. (Italian.) **The Protection of Stainless Steels Against "Pitting" in a Saline Medium.** L. Cavallaro and C. Bighi. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 361-365.

Protection of 18/8 austenitic steel against pitting effect of salt solutions by means of small additions of caustic soda. (R5, R10, SS)

547-R. (Italian.) **The Phenomenon of Erosion by Pitting, With Particular Regard to Tappets.** L. Locati and A. Ferro. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 448-455.

Distribution of stresses during rotation was investigated, with special regard to pitting of steel and cast iron tappet parts for internal-combustion engines. Mechanical properties of several types of carbon steel and cast iron heat treated in different ways, are tabulated. (R2, Q general, CN, CI)

S
INSPECTION AND CONTROL

513-S. Fire Assay for Osmium. W. J. Allan and F. E. Beamish. *Analytical Chemistry*, v. 24, Oct. 1952, p. 1569-1572.

Experimental data and results on efficiency of fire assaying show that fusion results in formation of an unusually stable form of osmium. (S11, Os)

514-S. Microdetermination of Osmium. W. J. Allan and F. E. Beamish. *Analytical Chemistry*, v. 24, Oct. 1952, p. 1608-1612.

Method for colorimetric determination of Os by thiourea. It is useful for determination of from 80 micrograms of Os in 200 ml. to 5 mg. in 1 liter with a relative error of 5%. This method is said to be the first application of organic reagents for determination of Os. 14 ref. (S11, Os)

515-S. The Non-Destructive Investigation of Surface Defects. W. Stauffer and A. Keller. *Escher Wyss News*, v. 23-24, 1950-51, p. 98-101.

Various methods used by the Escher-Wyss organization. Typical results obtained with the lacquer-replica process with surface defects rendered visible by various methods. (S14)

516-S. Ultrasonic Inspection; Its Application in the Production of Cast Rolls. E. B. Ellis. *Iron & Steel*, v. 25, Oct. 1952, p. 429-432.

Reflection method of employing ultrasonic waves. Photographs and diagrams. (S13, CI)

517-S. A Description of the Arc and Spark Spectra of Rhenium. William F. Meggers. *Journal of Research of the National Bureau of Standards*, v. 49, Sept. 1952, p. 187-216.

Description was obtained by using solid Re electrodes and conventional arcs or sparks, photographing spectra with the aid of large spectrographs containing concave gratings, and measuring wavelengths of spectral lines relative to secondary standards in spectrum of iron. Extensive table. 24 ref. (S11, Re)

518-S. Hot Radiography Cuts Weld Inspection Time. Alexander Gobus. *Steel*, v. 131, Oct. 27, 1952, p. 72-73.

Apparatus and technique. Comparison with other techniques in relation to time and accuracy. (S13, K9)

519-S. High Temperature Thermocouples. H. A. Wilhelm, H. J. Svec, A. I. Snow, and A. H. Danne. *U. S. Atomic Energy Commission*, AECD-3275, June 29, 1948, 8 pages.

Preparation, calibration, and performance. Data especially for the Ta-W and Cb-W thermocouples. Latter proved best—for temperatures up to about 2000° C. Graphs. (S16)

520-S. Regulating Systems for the Steel Industry. W. R. Harris. *Westinghouse Engineer*, v. 12, Nov. 1952, p. 187-194.

Regulation of continuous mills and processing lines in steel industry. Examples can be found in electrolytic tinning lines; continuous pickling and galvanizing lines; also blooming, slabbing, or plate mills. Graphs, diagrams, and photographs. (S18, L12, L16, L17, F23, ST)

521-S. Spectrographic Copper Standards. D. M. Smith. *Spectrochimica Acta*, v. 5, July 1952, p. 1-4.

Three graded series of "Matthey" copper standards are in course of preparation, intended to cover ranges 0.05%-0.0001% of Al, Sb, Bi, Cr, Ga, Pb, Ag, Sn (Series A), Co, Fe, Mn, Ni, Si (Series B), and 0.05%-0.001% of As, Be, P, Se, Te, Zn (Series C). Satisfactory checks have been obtained in the case of Bi, Ag, Sn, Co, and Mn; and investigation of remaining elements is in progress. (S11, Cu)

522-S. (German.) **Spectrographic Analysis of Nickel-Cobalt Alloys in the Range From 0-100%.** W. Seith and A. Kottmann. *Spectrochimica Acta*, v. 5, July 1952, p. 36-40.

Spectrographic analysis may be extended to whole range of Ni-Co system when purpose of analysis is the determination of diffusion coefficient of solid metals. Samples of about 20 mg. from successive layers of metal were analyzed. Data are tabulated. (S11, Ni, Co)

523-S. (German.) **Observations of the Sensitivity of Spectroscopic Detection of Impurities in Lead.** Enrico Arreghini and Tullio Songa. *Spectrochimica Acta*, v. 5, July 1952, p. 114-123.

Impurities in Pb were grouped according to Hume-Rothery's rules. In one class, sensitivity follows the order of the heats of vaporization. Position of the ultimate lines is the controlling factor in the other group. 39 ref. (S11, Pb)

524-S. (Italian.) **Spectrochemical Determination of Silicon in Cast Iron and Observation of the Corresponding Microstructure.** M. S. Rosetta. *Spectrochimica Acta*, v. 5, July 1952, p. 77-86.

Determinations using a spark source and quartz spectrograph of medium dispersion. Comparison of effect on spectrochemical results of diameter of cast electrodes. This is partially explained by variations in microstructure of cast rods; pearlitic structure is to be preferred. (S11, M27, CI)

525-S. (Italian.) **Observations of the Spectrographic Analysis of Cast Iron.** R. Berta and A. Palisca. *Spectrochimica Acta*, v. 5, July 1952, p. 87-96.

Cast pencil electrodes were found to be superior for determining Si in cast iron. Chemical and spectrographic analyses are compared. (S11, CI)

526-S. (Italian.) **The Use of Spectrochemical Analysis for Direct Reading With the Quantometer for Production Control of Special Steel.** Lino Benussi and Alessandro Caroli. *Spectrochimica Acta*, v. 5, July 1952, p. 97-113.

Use of the quantometer in steel analysis. Tables illustrate arbitrary

correction factors for each element. The advantages of quantometer control. (S11, AY)

527-S. (German.) **The Use of Gamma-Ray Emitting Isotopes in Nondestructive Materials Testing.** Hugo Juvan. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Sept. 1952, p. 165-176.

Brief review of history, followed by discussion of different radioactive materials and isotopes and principles of using them in radiography. Various instruments are illustrated. Data are graphed and tabulated. 11 ref. (S19)

528-S. (German.) **Determination of the Thickness of Metal Deposits on Aluminium by Means of Chemical Stripping.** W. Wiederholt and B. Kaspras. *Metall,* v. 6, Sept. 1952, p. 509-511.

Determination of the thickness of Cr, Ni, Cu deposits on Al and Al alloys by means of fuming HNO_3 with small additions of chloric acid or potassium chlorate. Advantages and results of the method. (S14, L17, Al, Cr, Ni, Cu)

529-S. (German.) **Radiographic Thickness Measurement of Electrodeposits With the Aid of a Counting Tube Interference Goniometer.** V. Gerold. *Zeitschrift für angewandte Physik,* v. 4, July 1952, p. 247-254.

New method eliminates the disturbing effect of the surface texture of the plated metal on X-ray results. Diagrams, tables, and graphs. 13 ref. (S14)

530-S. (Italian.) **The Possibility of Use of Gamma Rays in Radiography of Light Metals.** M. Robba. *Alluminio,* v. 21, no. 4, 1952, p. 352-362.

Development of satisfactory method, based on control of the relationship between diffused and absorbed radiation. Graphs, tables, and radiographs. (S13, Al, Mg)

531-S. (Italian.) **Discussion of Symbols for Steels, and of Their Standardization in Italy.** G. Zanini ZaZinovich. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 573-582; disc., p. 582-584.

Symbols for commercial, ordinary, and high-quality steels. Italian and French symbols and compositions are tabulated. (S22, ST)

532-S. (Russian.) **New Standards for Steel Articles for Electrical Equipment.** D. V. Krotkov. *Electrichestvo,* Mar. 1952, p. 75-77.

New specifications for "Multiple-Strand Steel Wires for Overhead Electrical Transmission Lines" and "Electrodes for Arc Welding". (S22, T1, K1, ST)

533-S. Inorganic Chromatography on Cellulose. Part XIII. Determination of Tantalum and Niobium in Low-Grade Phosphatic and Siliceous Ores. R. A. Mercer and A. F. Williams. *Journal of The Chemical Society,* Sept. 1952, p. 3399-3403. (S11, Ta, Cb)

534-S. Sampling of Liquid Steel for Dissolved Oxygen. G. F. Huff, G. R. Bailey, and J. H. Richards. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1162-1165; disc., p. 1165-1167.

An improved bomb-sampling technique for obtaining samples for oxygen analysis from liquid steel. Analyses of samples taken from open-hearth furnaces by improved method show sufficient agreement with laboratory data to indicate that accuracy of method is better than that of other sampling methods. Photographs and graphs. (S11, ST)

535-S. Electric Brains Expand Steel's Muscle. W. R. Harris. *Steel,* v. 131, Nov. 3, 1952, p. 106, 108, 110, 115; v. 131, Nov. 10, 1952, p. 112, 114, 117, 120, 122, 124, 126.

How automatic regulating systems for main and auxiliary mill drives get more tonnage from existing equipment through higher operating speeds. Use in tandem cold reduction mill, and blooming or slabbing mill. Second part: Examples of problems that must be solved when applying drives to steel mill machinery. (S18, F23, ST)

536-S. Practical Ultrasonic Material Testing. W. Felix. *Sulzer Technical Review,* no. 2, 1952, p. 19-31.

The Hughes unit employed by Sulzer Bros., and practical procedure followed. Possibilities and limitations inherent in interpretation of flaw indications by this method, with special reference to intensity ratio between flaw echo and bottom echo and to the usefulness of absorption phenomena observed during multiple reflection as a means of determining material properties. A few special applications of ultrasonic testing, such as examination of welds, testing of adhesion between shells and white-metal linings of bearings, and inspection of shrink fits. Diagrams, graphs, and photographs. (S13)

537-S. A Semiquantitative Spectrographic Method for the Analysis of Minerals, Rocks, and Ores. II. C. L. Waring and C. A. Annell. *U. S. Atomic Energy Commission,* TEI-215, Feb. 1952, 28 pages.

Scope of method previously described for determination of 55 elements has been increased to 68 elements which can be estimated in one exposure of a 10-mg. sample. Lists 336 chemical analyses that indicate approximately 8% disagreement. Extensive tables. (S11)

538-S. (German.) **Experiences With the Magneto-Inductive Testing of Bar Steel for Cracks.** Hans Beuse and Herbert Koelzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 363-367; disc., p. 367.

Adequacy of this inspection method depends on elimination of all external disturbing influences. Its success and limitations, individually discussed, point to the need of further research on magneto-inductive testing. (S13, ST)

539-S. Compressor-Blade Inspection. *Aircraft Production,* v. 14, Nov. 1952, p. 381-387.

High-speed, multidimensional equipment incorporating air gages of adjustable sensitivity. Diagrams and photographs. (S13)

540-S. Magnetic Sorting. *Aircraft Production,* v. 14, Nov. 1952, p. 389-391.

Application and interpretation of bridge-type instrument. Diagrams and photographs. (S10)

541-S. How Round is Round? Albert C. Sanford. *American Machinist,* v. 96, Nov. 1952, p. 124-126.

How out-of-roundness is measured and why it cannot be measured by conventional methods. Gages illustrated. (S14)

542-S. The Polarographic Determination of Titanium in Aluminium Alloys. R. P. Graham and A. Hitchen. *Analyst,* v. 77, Oct. 1952, p. 533-537.

Compares results with those obtained by other methods. 11 ref. (S11, Ti)

543-S. Strain Gage Transducers for Measurement and Control. R. J. Fyffe. and A. Arobone. *Product Engineering,* v. 23, Nov. 1952, p. 121-148.

Bonded and unbonded gages, types of bridge circuits, amplifying and recording equipment, different types of transducers designed specifically for measuring pressure flow, weight, and displacement. Case histories illustrate unusual applications. Tables, diagrams, and photographs. (S18)

544-S. Quality Control: It's in the Reach of Small Foundries. William J. Sommer. *Steel,* v. 131, Nov. 17, 1952, p. 86-88.

Basic elements needed to start an effective control program. (S12, E general)

545-S. Non-Destructive Tests for Detecting Faults in Metal Parts. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 22, Nov. 1951, 11 pages.

Testing techniques. 53 ref. (S13)

546-S. Statistical Evaluation of Rational and Stratified Methods of Sampling. Part III and IV. James V. Strela. *Tool Engineer,* v. 29, Oct. 1952, p. 55-60; Nov. 1952, p. 56-61.

See abstract of parts I and II; item 469-S, 1952. (To be continued.) (S12)

547-S. (French.) **X-Ray Examination of Light Alloys. Study of Some Difficulties in the Interpretation of Radiographs.** Gaston Gauthier and Martial Renouard. *Revue de Métallurgie,* v. 49, Oct. 1952, p. 720-725; disc., p. 726.

Dangers of misinterpretation. Micrographs and radiographs. Work was confined to various types of Al alloys. (S13, M21, Al)

548-S. (German.) **Gas Sampling Apparatus for the Control of Blast Furnace Operation.** Walter Loorz. *Stahl und Eisen,* v. 72, No. 22, Oct. 23, 1952, p. 1325-1328.

Correlations between burden distribution and gas passage. Description of measuring devices used up to the present includes apparatus for continuous gas sampling and temperature measurement at the top. Method of operation, results, and conclusions. Schematic diagram and temperature curves. (S11, D1, Fe)

549-S. (German.) **Measuring the Temperature of Liquid Steel in the Basic Converter by Means of the Immersion Thermocouple.** Karl Georg and Otto Därmann. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1336-1346.

Compares steel temperatures in the converter when blowing period is nearly completed with observations made in the casting pit. Relationship between temperature and nitrogen content. Tables, graphs, and diagrams. 21 ref. (S16, D3, ST)

550-S. (German.) **Optical Temperature Measurements and Contribution to the Radiation Analysis of Cast Iron.** Kurt Orths. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1349-1353.

Temperatures were measured by means of colorimetric type "Bioptix". It was possible to predetermine quality by means of temperature measurements, radiation analysis, and reflection data of foundry pig-iron melts. Micrographs and graphs. (S16, CI)

T

APPLICATIONS OF METALS IN EQUIPMENT

550-T. Wire Rope Deservese Protection Against Wear and Weather. L. E. Dressler. *Drilling,* v. 13, Sept. 1952, p. 196-197.

See abstract of "Selection, Care, and Maintenance of Wire Rope in Mining". A. J. King, *Mining Congress Journal,* item 534-T, 1952. (T28, Q general)

551-T. Printed Circuits for Home Radio Receivers. Elmer Waverling. *Electronics,* v. 25, Nov. 1952, p. 140-142.

Method for producing the circuits in which foil-thickness Cu is electroplated on an insulating base where conductors are desired and concurrently on walls of previously punched holes through the base. (T1, L17, Cu)

552-T. Ductile Iron. A New Engineering Material for Water Works Construction. C. T. Haller. *Journal, American Water Works Association,* v. 44, Oct. 1952, p. 912-922.

Internal structure, mechanical properties, production, and applications are considered. Micrographs, photographs, and graphs. 12 ref. (T4, Q general, M27, CI)

553-T. Aluminum Alloys in Civil Engineering Practice. Parts 3-4. S. K. Ghaswala. *Light Metal Age*, v. 10, Aug. 1952, p. 21; Oct. 1952, p. 18, 20. (T4, Al)

554-T. Beryllium-Copper Useful for Large Machine Parts. John T. Richards. *Materials & Methods*, v. 35, June 1952, p. 97-99.

High corrosion resistance, wear resistance, electrical conductivity, and impact strength are some of the properties that led to the choice of Be-Cu for five typical applications—dies for deep drawing stainless, flash welding electrodes, grinding machine clamps and seam welder wheel bushings. (T7, T5, Q general, P15, R general, Cu)

555-T. Aluminum Foil. Thomas M. Hill. *Tappi*, v. 35, March 1952, p. 123A-130A.

Production; physical, mechanical, and chemical properties; corrosion resistance; and packaging characteristics. (T10, Al)

556-T. Ferrous Metal Tubing in Oil Refining Processes. H. D. Newell and J. J. B. Rutherford. *Third World Petroleum Congress, Proceedings*, sec. VIII, 1951, p. 13-14; disc. p. 43-49. (T29, ST)

557-T. Large-Diameter High-Strength Pipe for Oil and Gas Transmission. Paul E. Noll. *Third World Petroleum Congress, Proceedings*, sec. IX, 1951, p. 29-48, disc., p. 49.

Characteristics of available high-strength pipe and their relation to pipeline design. Means of increasing strength, and characteristics and processes of manufacture of most common type of high-strength pipe, namely expanded or cold-worked pipe. Effect of expansion, both as affected by amount of deformation and by chemical composition of steel. Effect of heat on tensile properties of expanded pipe. An effective yield strength test of a section of pipe, in which incidental observations were made by means of brittle coating. Graphs and macrographs. (T4, F26, Q general, CN)

558-T. (German.) **Possibilities for Improvement of Bearings Made of Sintered-Metal Powders.** Theodor Hövel. *Stahl und Eisen*, v. 72, Sept. 11, 1952, p. 1157-1159.

Sintered iron-powder bearings with oil chambers, self-lubricating bearings made of sintered metal powders with graphite additions, advantages of supporting bushings of sintered iron powder, and multiface sleeve bearings made of sintered iron powder. (T7, H general, Fe)

559-T. The Role of Castings in the Agricultural Industry. William G. Gude. *Foundry*, v. 80, Nov. 1952, p. 114-117, 228, 231, 234.

Demand for above and comparison with consumption in other industries. Advancements in use of materials from early Cu castings to present-day steel, nodular iron, and malleable iron. (T3, CI, ST)

560-T. Material Selection Factor Significant in Bourdon Tubes. J. B. Giacobbe and A. M. Bounds. *Journal of Metals*, v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 1147-1148.

Lists ferrous and nonferrous materials used for Bourdon tubes in three groups—strain hardened, precipitation hardened, and heat treated (quenched and drawn), and analyzes each group with reference to corrosion resistance and ability to be soldered and brazed. (T8, R general, K7, K8)

561-T. Sheathing Aluminium Cable. *Overseas Engineer*, v. 26, Nov. 1952, p. 138-139.

Process for sheathing Al cable now in use as a substitute for Pb. (T1, Al, Pb)

562-T. High Temperature Metallurgy: Jetomic Age Demands It. Bernard P. Planner. *Steel*, v. 131, Nov. 3, 1952, p. 98-100, 102.

Advantages and disadvantages of metals, ceramics, and their combinations for use in high-temperature environments. (T25, SG-h)

563-T. Aluminum Used for Main Girder of Emergency Dam at Morgantown. *Engineering News-Record*, v. 149, Nov. 13, 1952, p. 26.

Brief illustrated description. (T4, Al)

564-T. Magnesium in the Graphic Arts. Edward R. Owen. *Magazine of Magnesium*, Nov. 1952, p. 2-6.

Emphasis on Mg-alloy printing plates (flat and cylindrical). (T9, Mg)

565-T. Service Experience With Magnesium Bakery Equipment. Ralph G. Gillespie. *Magazine of Magnesium*, Nov. 1952, p. 10-13.

Equipment of Awrey Bakeries, Detroit. Advantages as compared to metals previously used. (T29, Mg)

566-T. *P-N* Junctions by Impurity Introduction Through an Intermediate Metal Layer. L. D. Armstrong. *Proceedings of the I.R.E.*, v. 40, Nov. 1952, p. 1341-1342.

An experimental method for making *p-n* junctions by alloying and diffusing In into *n*-type Ge through an intermediate thin layer of some other metal, such as Au, which has been plated on Ge. Applications were made to rectifiers and transistors. (T1, N1, Ge, In, Au)

567-T. Silicon *P-N* Junction Alloy Diodes. G. L. Pearson and B. Sawyer. *Proceedings of the I.R.E.*, v. 40, Nov. 1952, p. 1348-1351.

Features of these include large rectification ratios, ability to operate at high ambient temperatures, a flat Zener characteristic over several decades of current, and ability to operate usefully at frequencies up to 20 mc. Graphs and photograph. (T1, P15, Si)

568-T. Modern Developments in Drum Making. C. Gelderman. *Third World Petroleum Congress, Proceedings*, sec. IX, 1951, p. 50-60; disc., p. 60-63.

Survey covering past 30 years. Equipment and procedures for forming, arc welding of seams, and paint coating. (T29, G general, K1, L26, CN)

569-T. A Developmental Germanium *P-N-P* Junction Transistor. R. R. Law, C. W. Mueller, J. I. Pankove (Pantchechnikoff), and L. D. Armstrong. *Proceedings of the I.R.E.*, v. 40, Nov. 1952, p. 1352-1357.

A developmental germanium *p-n-p* junction transistor that may be readily made in laboratory by alloying Ta into opposite faces of a wafer of single-crystal *n*-type Ge. Graphs. (T1, Ge, In)

570-T. Metal-Carbon Composites for Mechanical and Electrical Parts. E. P. Eaton, Jr. *Product Engineering*, v. 23, Nov. 1952, p. 173-175.

Impregnation of C with molten Cu, Ag, or Cd produces a composite material with mechanical and electrical properties not obtainable in individual ingredients. Photograph and tables. (T1, T7, Cu, Ag, Cd)

V

MATERIALS
General Coverage of Specific Materials

200-V. Chromium-Vanadium Steels. *Materials & Methods,* v. 35, Apr. 1952, p. 139.

A data sheet. Compositions, physical and mechanical properties, thermal treatments, formability, machinability, weldability, corrosion resistance, available forms, and uses. (AY)

201-V. Metallurgical Problems of Nuclear Reactors. H. M. Finniston. *Research,* v. 5, Oct. 1952, p. 456-463.

Extraction, manufacture, and properties of U, Pu, Th, Be, and Zr; the problem of irradiation as it may affect the properties of the reactor materials; and corrosion problems of reactors. Micrographs and tables. (T25, P13, EG-h, U, Pu, Th, Be, Zr)

202-V. The Technology of Tin. Bruce W. Gonser. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 55-63.

Purpose of report is to aid in evaluating technological position of tin and to foresee technical developments which may affect its uses in next 25 years. Sources, elimination of waste, substitutes, and new uses. 13 ref. (B10, T general, Sn)

203-V. The Technology of Zirconium. Robert I. Jaffee and Ivor E. Campbell. "Resources for Freedom Vol IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 83-93.

Production problems, new processes, means of improving performance—largely with respect to corrosion resistance and mechanical properties, present and potential applications, and future prospects. (Zr)

204-V. The Technology of Uncommon Metals. Bruce W. Gonser and others. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 95-114.

Each metal or group of metals is discussed briefly to show its probable future technological development and how it may affect supply or usefulness of other metals. Includes sections on alkali metals, alkaline-earth metals, antimony, arsenic, bismuth, boron, cadmium, gallium, germanium, hafnium, indium, mercury, platinum-group metals, rhenium, selenium, silicon, tellurium, thallium, thorium, cerium and other rare earths. 57 ref. (EG-b, c, e, g)

205-V. Germanium, Produced as a Byproduct, Has Become of Primary Importance. A. P. Thompson and J. R. Musgrave. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1132-1137.

Early history, occurrence, recovery, purification, and uses of Ge. Photographs and diagrams. 30 ref. (Ge)

206-V. Molybdenum. J. Lomas. *Mine & Quarry Engineering,* v. 18, Nov. 1952, p. 351-353.

Resources, production, properties, and applications. (Mo)

207-V. Zirconium. A. D. Merriman. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 1003-1005, 1008.

Effects of O_2 and N_2 on hardness of Zr, factors influencing cold and hot workability, effects of reduction processes on mechanical properties of Zr, chemical corrosion resistance, machinability, weldability, alloy compositions, and applications. (Zr)

208-V. Copper in Stainless Steels. Helmut Thielsch. *Welding Research Council,* Bulletin Series 9, Aug. 1951, 31 pages.

Physical, metallurgical and welding properties of Cu-bearing stainless steels containing up to 30% Cr and between 0 and 35% Ni. Phase relations, hot working properties, corrosion resistance, age hardening characteristics, effects of Mn, Si, Mo, Cb, Ti, W, Be, V, etc. Detailed tables list the various patented and commercial alloys. Micrographs and graphs. 166 ref. (SS)

209-V. (Book.) **Titanium Metal and Its Future.** R. M. Burston, C. D. Crosby, G. A. Goetz, W. M. Minkler, Fred Nadherny, G. P. Little, G. J. Sella, W. W. Sherrill, and J. M. Wermuth. 100 pages. 1952. Graduate School of Business Administration, Harvard University, Cambridge, Mass. $10.00.

Objective view of the latest titanium developments for the nontechnician. Properties of metal, its alloys, ores, melting and forming, and fabrication are dealt with in the chapter on basic products. Companies producing titanium today, experiments in progress, market, and current production costs. Future of Ti in terms of processing and costs, alloys, markets, applications, competition, and location of the industry. Drawings, charts, and tables. (A4, Ti)

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Midwest

METALLURGIST: Challenging opportunity for personal and professional development with expanding medium-size chemical company in Detroit area. Work involves engineering and research on materials of construction for process equipment, corrosion investigations, economic analyses, application development of stainless steels, special metals. Experience desired but not essential. Excellent retirement, life insurance, hospitalization program. Give complete resume in reply. Box 12-20.

GRADUATE METALLURGICAL STUDENT: Large midwestern university offers an excellent opportunity for a first or second year graduate student interested in fundamental work on diffusion in metals leading to advanced degree. In reply please give information on academic background and degree towards which work would be done. Box 12-25.

METALLURGICAL ENGINEERS: Excellent opportunities for engineers in all phases of metallurgy, either ferrous or nonferrous. Salary commensurate with experience. Best technical facilities and top level co-working engineers. Please send qualifications to: Education Dept., Westinghouse Electrical Corp., East Pittsburgh, Pa.

WELDING RESEARCH ENGINEER: Company which has pioneered in welding and is considered by industry as leader in the field, has an excellent opening for a welding engineer with experience in resistance welding. This is an interesting position in the development of welding application to diversified projects. If you are interested in doing resistance welding research and development, we invite your inquiry. Box 12-30.

METALLURGIST: Thoroughly conversant with tool steels. Should be able to handle customer complaints and write reports. Should also be able to conduct research under guidance. Salary dependent upon experience and initiative. Address replies: Firth Sterling Inc., McKeesport, Pa.

RESEARCH METALLURGIST: For research on high-temperature alloys. Should be familiar with microscope and metallurgical laboratory apparatus. Should be able to initiate experiments on melting and hot working. Salary open. Address replies: Firth Sterling Inc., McKeesport, Pa.

METALLURGIST: Young graduate metallurgist wanted for laboratory work in applied research for progressive steel company. Must

WANTED

BY INDUSTRIAL FURNACE MFGR.

MANUFACTURERS' REPRESENTATIVE

with successful sales background in heat treating equipment field, furnaces, ovens, etc.—or their component parts, refractories, burners, instruments, etc. Several key areas open. Write confidentially giving full details as to experience and lines currently represented. Our employees are aware of this opening. Box 12-95, Metals Review.

be capable of directing projects and evaluating results of experimental work. Opportunity for advancement commensurate with ability. Salary open. Box 12-100.

WELDING ENGINEER or METALLURGIST: With minimum of five years experience, preferably in welding of pressure vessels and piping. Development and production follow work on components. Background in fabrication in stainless steel highly desirable but not essential. Address reply to: Supervisor, Industrial Relations, Westinghouse Atomic Power Division, P. O. Box 1468, Pittsburgh 30, Pa.

RESEARCH AND DEVELOPMENT METALLURGISTS: Attractive positions open for graduate metallurgists. Assignment in both ferrous and nonferrous metallurgy in new laboratory of large automotive plant in Detroit. Salaries are attractive and advancements are excellent. Box 12-105.

GRADUATE RESEARCH ASSISTANTSHIP: Nonferrous foundry research. Academic year appointments starting preferably in February 1953. Leads to M.S. in metallurgical engineering. Stipend $1250 for 10 months. Opportunity for summer work. Send transcript and personal data to: Prof. E. R. Shorey, Chairman, Department of Mining and Metallurgy, 1509 University Ave., Madison, Wis.

Southwest

METALLURGIST — CHEMIST: To take charge of metallurgical activities in new plant now being built in central Texas, by established concern, for the manufacture of oil well drilling equipment. Must be capable of setting up and operating chemical and metallurgical laboratories. Experience in carburizing and heat treating alloy steels desired. Box 12-35.

POSITIONS WANTED

METALLURGIST: Six years experience in cupola melting control in large midwestern foundry producing gray and malleable iron, and five years experience in heat treating and other related metallurgical process control and inspection operations. Willing to relocate. Would accept position in melting or heat treatment control. Would also consider sales work. Box 12-40.

CHIEF METALLURGIST: Two years as head of rock drill steel development and quality control in steelworks in Sweden, where extensive use of industrial statistics in development and control work involved. One and a half years as quality manager, reorganizing inspection system and introducing statistical control. Seven years as chief engineering metallurgist as responsible head of engineering materials and process research and development. Eleven years as metallurgist, head of laboratory, responsible for special materials processing from melting to final inspection. Has many published articles. Now employed in Sweden, wishes to return to the United States where most of his former experience has been. Box 12-45.

METALLURGIST: Unmarried, age 39. Fifteen years experience as all-around factory worker; knowledge of foundry practices and several years of foundry work. Desires position with company where there will be opportunity to advance in accordance with abilities. Prefer position where employer demands dependable, sober, ambitious man with excellent work record. Willing to alter residence. Salary not as important as opportunity to advance. Box 12-50.

WELDING ENGINEER: Graduate with ten years experience in shipbuilding, oil refinery pressure vessels, power plant equipment fields. Age 31. Desires supervisory position in welding production, engineering, or sales. Box 12-55.

MATERIALS ENGINEER: Twenty - three years experience in aircraft and light metals industries. Desires position in any field requiring broad knowledge of material specifications, standardization, design metallurgy, applications, data presentations, etc. East coast or west coast locations preferred. Box 12-60.

METALLURGIST: Prefers development and research or field and report work. Graduate metallurgist and combustion training. Age 27, draft exempt. Experience includes three years in steel mill, two years in industrial combustion. Prefers Pittsburgh area but for opportunity and security will relocate. Available immediately. Box 12-65.

PHYSICAL METALLURGIST: M.S. in physics and metallurgy, working towards Ph.D. in physics. Age 30. Eight years of basic and applied research. Experience in applied physical and engineering metallurgy, high temperature, magnetic, semiconductor, carbide, materials, etc. Familiar with microscopy, X-ray diffraction. Supervisory, administrative experience. Desires challenging executive position with progressive organization. Box 12-70.

METALLURGIST: Eighteen years experience as laboratory supervisor, materials and methods investigation, and production troubleshooting. Heavy experience in heat treatment, pressworking, welding, machining of a variety of nonferrous and ferrous materials. Some work on forging and casting. Served as chief metallurgist for last twelve years. Publications. Prefer midwest but will consider other offers. Box 12-75.

METALLURGICAL ENGINEER: Graduate, veteran, age 31, executive caliber. Experienced in heat treating, ore shipping. Five years successful supervisory work. Available immediately. Would relocate U. S. or foreign. Prefer position in technical service and sales or operation. Box 12-80.

METALLURGICAL ENGINEER: M.S. degree. One and a half years experience in precision forging of high temperature alloys, stainless steel and titanium. Some failure analysis and alloy development work. Now seeking position in ferrous or high temperature alloy development. Age 27, married, one child. Eastern location desired. Box 12-85.

METALLURGIST: B.S. degree. Married, one child. Twelve years experience. Background in melting, fabrication, research and investigation of openhearth, stainless and toolsteels. Ability to train. Likes people. Served in supervisory and research capacities. Seeks responsible position in development, production or metallurgical contact work with reliable company. Box 12-90.

15 TYPES
INDUSTRIAL POT FURNACES . . .
GAS - OIL - ELECTRIC.
SALT BATH CONVEYORS.

HOLDEN
METALLURGICAL PRODUCTS
TRADE MARK REGISTERED

50 SALT BATH
COMPOSITIONS FOR ANY
HEAT TREATING APPLICATION.
BLACKING BATH.

ADDITIVES—VERSUS—RECTIFIERS

The benefits of the new combinations of salt baths containing additives can be summarized briefly as follows:

1. **The additives do not create sludges, but rather act to neutralize alkalies.**

2. **Further, the additives react with metal oxides which cause decarburization and sludge to decompose these oxides either partially to gases, or to complete reaction which is approximately the same specific weight as the salt compound. This therefore eliminates sludges, except for contamination from fixtures.**

3. **Additives in the high temperature baths, when used for hardening high speed steels, whether with inconel or chrome electrodes, keep the electrodes clean, preventing attack at the grain boundaries and further convert the chrome oxides to pure metallic chrome.**

4. **The use of these additives, therefore, plays an important part in maintaining the fluidity of your salt bath and lengthening the life of the electrodes. Also, these salt baths which have additives in them, when used in alloy pots, react with alkalies and metal oxides, nullify the effects at the grain boundaries of the alloy pots.**

5. **These products—Hardening 185-10, Hardening 127-11, Hardening 127-12, Hard Brite AA-10, High Speed Preheat 13-17-10 and High Speed 17-24 AA-10—will increase electrode life, ceramic and alloy pot life.**

6. **Holden Salt Baths can be used in any type of competitive furnace. We will assume manufacturer's guarantee with any proven design.**

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If you are having trouble with sludging, short electrode life, short alloy pot life, your initial order for Holden Salt Baths should clearly demonstrate the improvements which can be effected in your operating department.

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